

## **SPECIFICATION PREFACE SHEET**

DEPARTMENT: Engineering / Electrical

SHEET 1 OF 7

AREA: Norðurál Grundartangi Reduction Plant

SPEC No: 00/07/TS002

REV: C2

**STANDARD TECHNICAL  
SPECIFICATION  
FOR  
INSTRUMENTATION**

# **PANEL MOUNTED INSTRUMENTS**

**This Standard Technical Specification is subject to change without prior notice. The most current issue will at all times be located on the Nordural web site, [www.nordural.is](http://www.nordural.is)**

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**NORÐURÁL - ENGINEERING**

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## **TECHNICAL SPECIFICATION**

### **1.0 INTRODUCTION**

In this Document the following words and expressions shall have the meaning hereby assigned to them except where the context otherwise requires:

**Engineer:** The Owner or any person or organization employed or engaged at any time by the Owner and authorized by the Owner, in writing, from time to time to act on behalf of the Owner in the execution of the items covered by this Document, in whole or in any part, for any or all purposes provided in this Technical Specification.

**Owner:** Norðurál hf (Nordic Aluminum Corporation Ltd.), an independent legal entity owned by Century Aluminum.

### **2.0 GENERAL**

Indicators for process and mechanical measurements shall either be moving pointer type, bar graph or digital as appropriate to the duty, however a consistent approach shall be maintained throughout the project on the choice of indicator types.

When circular type indicators are employed, these shall generally be a minimum 240° deflection for full scale. For indication of process variable, scale lengths of either circular or edge wise indicators shall be a minimum of 125 mm unless otherwise approved by the Engineer. Smaller scale sizes may be used where accuracy of indication is not essential. e.g., regulator positions.

All moving pointer type instrument scales shall be clearly divided and indelibly marked. Printed with black divisions on a white background and the pointers shall be clean outline. The pointers shall be approved scales in accordance with BS 3693. The marking on the dials shall be limited to the measured unit and the scale graduations. Other markings and symbols shall not appear on the dials but shall be marked in an approved position. Instruments shall be fitted with glasses of low reflectivity that shall not cause pointer deflection due to electrostatic changes through friction.

If bargraphs are proposed the indicated value shall be clearly visible at a distance of 2 metres in a well lit control room. Scale lengths for process variables shall be as the moving pointer type.

Where multipoint indicators are specified these shall be of the digital display type with push-button selection. Each instrument shall have a permanently attached label identifying each of the displayed points. Where a group of points is continuously

scanned for alarm and/or display purposes the scanning mechanisms shall not be motor driven but should use an electronically driven relay selection scheme. The scan period shall not exceed 20 seconds for alarm functions and 45 seconds for display functions.

Recording instruments shall be of an approved type. Having servo system/potentiometric pen carriage deflection mechanism unless otherwise specified. The chart speed shall be programmable manually set to the 10 mm/hour but with high speed option for test purposes. Where two or more quantities are recorded on the same chart, they are to be distinguished by the use of distinctive colours. A label shall be attached to each recorder identifying each point displayed.

Panel mounted analogue instruments shall have scales suited to the range of the measurement, however, where possible digital indication are preferred.

Indicating and/or Recording instruments associated with vibration and speed of rotating machinery measurements shall be submitted for approval. Recording charts shall be generally scaled 0-10 linear or 0-10 sq. root (50 divisions).

Panel Recorders and indicators shall have an accuracy of equal to or better than  $\pm 0,5\%$  of instrument range.

Panel Indicators shall have an accuracy of equal to or better than  $\pm 0,5$  of instrument scale.

Flow quantity Integrators/Totalisers shall be of the non-resettable 8 digit numeric count type unless specified otherwise.

All panel instruments shall be flush mounted and provided with bezels to the colour specified or to the approval of the Engineer.

Configurable indicators/recorders are to be supplied configured in accordance with the specified parameters.

Where configurable instrument/recorders are used clear and concise configuration data shall be provided. If the instrument/recorders requires a separate configuration device the vendor shall supply this with the equipment.

### **3.0 ALARM ANNUNCIATION**

This section covers the detailed requirements for multiple alarm indication.

The supply shall include all display units together with power supplies, acknowledge, reset and test pushbuttons, audible warning devices and integral or remote mounted solid state alarm control units.

The equipment shall derive its power supplies from the instrument power supply system at 24 VDC

All alarms shall be initiated by opening contacts in a fail-safe mode and provision made to invert the alarm signal if necessary.

A system offering the facility of first-up indication shall be supplied.

At least 20% spare capacity shall be included on each alarm facia.

Where it is necessary to differentiate between the urgency of alarms then a separate distinctive audible device shall be provided. In addition an alarm beacon to the approval of the Engineer shall be provided for each desk or panel containing alarm annunciators.

The display unit shall consist of a rectangular frame or bezel enclosing the specified number of individual facias, each of which shall be in the form of a window inscribed with the specified legend. Alarm legends shall be in clear text succinctly describing the alarm condition. Alarm legends shall be submitted to the Engineer for approval. Abbreviations, if approved shall be in accordance with an agreed schedule of abbreviations.

The alarm system/plant signal interface shall be adequately protected to minimise the possibility of damage to the alarm system resulting from input signal disturbances such as grounding of either input lead, electro-magnetic signal pick-up etc. The method of isolation shall be stated e.g. optical isolation, and the common mode and series mode rejection voltage levels for signal interference and input stage damage shall be stated.

The field signal connections shall be to terminal blocks separating the internal wiring from the external cabling. The terminal blocks shall contain isolating links and provision shall be made for inhibiting either faulty or uncommissioned alarms. This may either be arranged by a system of shorting links associated with the input marshalling terminations or by facilities actually incorporated within the alarm monitoring system.

The facility shall ensure that any inhibit may be readily identified and shall be to the approval of the Engineer.

The operation of the first-up alarm system shall be the manufacturers standard design and full details shall be submitted with the tender. Notwithstanding this the system shall incorporate similar or equivalent features to the following:

(a) When an external alarm initiating contact changes state the audible warning shall sound continuously and the appropriate facia shall be illuminated by a flashing light at a frequency that allows the inscription to be easily read. The audible alarm may be silenced by operation of an acknowledge pushbutton. This shall bring all flashing alarms to a ready state except the first alarm to arrive which shall continue to flash with slower frequency then the frequency used when the alarm arived.

(b) A "Test" pushbutton shall be fitted to illuminate all the alarm facias and sound the audible alarm.

Any proposal for the grouping of alarms in one display shall be submitted to the Engineer for approval.

#### **4.0 MIMIC DIAGRAMS**

Hard wired process mimic diagrams shall be offered where specified or alternatively where their presence would assist plant operators in assimilating the operational state of the plant.

Where PLC based control is supplied a graphic video control panel is preferred. All mimic displays may then be configured.

The construction method offered for the mimic shall depend on the type of application, but shall be to the approval of the Engineer.

For systems that may be changed at various times the mosaic type shall be used in hard-wired system and for PLC based systems the graphic package shall provide facilities for editing.

For permanent or semi-permanent plant types using reverse printing or inlaid plastic strips shall be used. Type using normal front printing shall only be considered if the tenderer can demonstrate the full permanence of the marking.

Designs using plastic or other materials protruding beyond the front face of the panel shall not be acceptable.

Mimic diagrams or graphic displays offered shall meet the following general requirements.

(a) Different and distinctive colours shall be used for the different mediums around the plant as directed with Nordural Standard Technical Specification 00/07/TS011 and DIN 2403

(b) The position of control valves, control dampers and other control devices shall be indicated by continuous position indicators. The position of isolating valves or dampers shall be indicated by semaphore indicators or lamps. The normal operating devices for control valves or dampers may be incorporated with the mimic. The operation of isolating valves or isolating dampers shall be by means of discrepancy switches or pushbuttons designed to perform in a similar manner.