Heat Pump for Torfnes soccer field in Ísafjarðarbær, Iceland

Invitation to Tender

Technical specification for an air-to-water heat pump unit

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REPORT TITLE:
Heat pump for Torfnes soccer field, Ísafjarðarbær, Iceland

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1 GENERAL

1.1 Scope of Tender

This Technical Specification is for the design, supply, transportation, installation, testing, and start-up of a turnkey system for Heat Pump Plant for the Employer in conformity with attached specifications.

Included are all necessary equipment, instruments, all piping and wiring for making the equipment complete, all specified and necessary hardware fully assembled, inspections, manuals, training, software, licenses and all other required deliverables, services and supplies to complete a turnkey package for the purpose of producing hot water for Torfnes soccer field.

The Contractor selects optimal unit size and number of units for the plant.

The equipment shall be delivered fully designed, manufactured and factory tested in a bespoke building provided by the Owner.

1.2 Tender Option

The assumed nominal heating demand for snow melting of the soccer field is 1200 kW.

The option is to deliver this heating output with air-to-water heat pumps as follows:

Phase 1: 300 kW to 400 kW unit.

Phase 2: After test period, additional heat pump modules as required.

1.3 Evaluation of Tenders

The Bidders must fulfil certain financial qualifications set by the Employer and experience in large heat pumps systems using ambient air as heat source.

Tenders will be evaluated primarily on price, but output and electric power consumption will be evaluated.

Additionally, the Employer will consider the following to evaluate tenders, in any order of importance:

a) Number of units per plant
b) Heat Pump Plant installation cost
c) Cost for completion of the plant, i.e. building, electric power, testing and commissioning of plant.
d) Water temperature range delivered to the heating system
e) Coefficient of Performance (COP) at optimal design conditions, and Seasonal Performance Factor (SPF) according to the Load Duration Curve for the heating system
f) Large heat pump plant experience and proven technology
g) Design technicalities in terms of reliability and maintenance
h) Means and capacity to operate the Heat Pump Plant at optimum efficiency at variable loads.
i) Operational flexibility to meet variable ambient air temperature
j) Operation and maintenance cost - service interval

1.4 Torfnes soccer field

Torfnes soccer field is in Ísafjarðarbær town in the Westfjörds of Iceland. The field size is 105x70 m, topped with artificial grass in a rubber mat sublayer. PPr hot water heating coils, 25x2,3 mm, are embedded in a 120 mm thick sand layer, on top of compacted filling, Fig. 1.

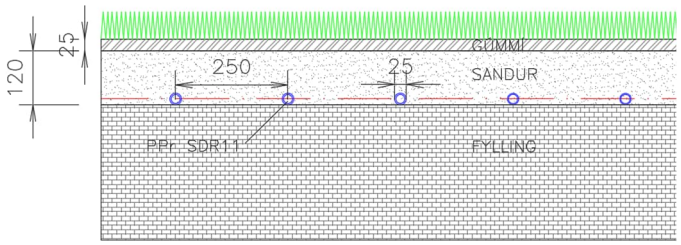

Figure 1.1 Cross section of Torfnes soccer field with artificial grass and hot water heating coils

1.5 Heat Pump Plant

The operators of Torfnes soccer field are working towards increasing the accessibility of the field throughout the winter months by providing heat to the embedded heating coils from a heat pump plant. This package is part of the required equipment to achieve this goal.

1.6 Milestone Dates

Offers received: 24th March 2026
Tenders reviewed: 9th April 2026
Contract appointment: 21st April 2026
Commissioning and start-up: 22nd September 2026

1.7 Regulations, Standards and Codes

The Contractor shall either obtain or assist the Employer in obtaining all permits and inspections required by building, safety code, ordinances, rules and regulations of any legal body having jurisdiction. All equipment shall be provided with a CE Mark and Declaration of Conformity to indicate compliance with relevant Council Directives.

Particular attention shall be given to the following directives and standards:

- Regulation 2023/1230/EU on machinery and repealing Directive 2006/42/EC
- Low Voltage Equipment 2014/35/EU
- Directive 2004/108/EC on Electromagnetic Compatibility
- ÍST EN 378-1:2016+A1:2020 Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria
- ÍST EN 378-2:2016 Refrigerating systems and heat pumps. Safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation
- ÍST EN 378-3:2017+A1:2021 Refrigerating systems and heat pumps. Safety and environmental requirements – Part 3: Installation site and personal protection
- ÍST EN 378-4:2016+A1:2019 Refrigerating systems and heat pumps. Safety and environmental requirements. Operations, maintenance, repair and recovery

The supplied equipment shall be CE marked as a whole.

The supplied equipment shall comply with all Icelandic laws and regulations.

Document Conflicts

The equipment is required to conform to this specification together with data sheets and other documents. In case of conflict among contract documents, the Bidder shall make note and seek resolution from the Employer.

1.8 Terms, Definitions, Symbols, and Units

Standardization of the purchased material/equipment shall be on the highest possible and practicable level. Contractor shall follow the recommendations of the contract conditions and the specifications. The standards, codes and regulations cited in this Standard Technical Specification are used to establish the level of precision, quality, class of materials, acceptability, tolerances etc., to which the work is to be performed. All measuring units in the technical documentation shall be expressed according to the SI- system and shall be used in all information and communication. The Contractor shall deliver and/or design and manufacture all equipment in accordance with metric standards. All documents, drawings, instruction manuals and test certificates shall use metric units.

- Units of the SI-System measurements are applied according to ISO 1000.
- 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.
- All drawings, specification, instructions, manuals and other documents shall be in the English language.
- According to EN standards, all text intended for use by operators shall be in both Icelandic and English languages

1.9 Site Conditions

All equipment and associated components shall be of a proven design and suitable for operation in conditions as specified.

All standard replacement parts shall come in metric sizes and be readily available in the EU market. The following table lists the main parameters of the Plant site:

Table 1.1 Site Conditions

Employer	Ísafjarðarbær
Site	Ísafjarðarbær (by the seaside)
Altitude (above sea level)	Approximately 6 m
Ambient outdoor temperature range	-15 to +20°C
Exclusion Zone	None
Seismic Zone	NA
Installation	Indoor and outdoor
Noise Requirement	Maximum sound pressure of <80 dB(A) at 1 m
Operating Mode	Continuous during heating season

2 PROCESS DESCRIPTION

2.1 Operating premises

The soccer field heating system will be operated for about six months a year, from middle of October to middle of April. Field surface temperature will be monitored with temperature sensors embedded in the rubber sublayer of the artificial grass, for example near the inside of the goal posts. Furthermore, there will be temperature sensors in the return water line from the field. Variable heat demand from the soccer field will be regulated by changing flow rate of hot water from the heat pump circuit (fixed supply temperature) to the field. Fixed water flow will be circulated through the heat pump heat exchanger (condenser).

2.2 Climatic conditions

The average daily minimum air temperature for October to April during the years 2006 to 2018 is shown in Fig. 2.1. From this data the design air temperature for the heat pump may be set to -4°C to -5°C. However, the minimum monthly temperature is 6°C lower than the average daily minimum, so to cope with that situation the heat pump would have to be designed for -11°C.

For this work, the heat pump shall be able to maintain 100% heating capacity down to -7°C.

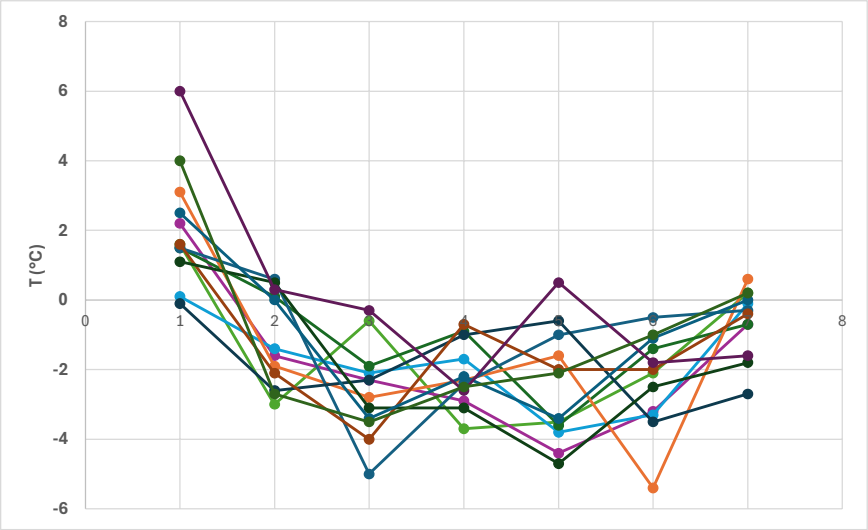

Figure 2.1 Average daily minimum temperature for October to April (incl.), 2006 to 2018 Icelandic Met. Office (http://www.vedur.is/vedurfar/medaltalstoflur)

2.3 Soccer field heating system w/heat pump

Figure 2.2 indicates how a heat pump could be integrated in the soccer field heating system.

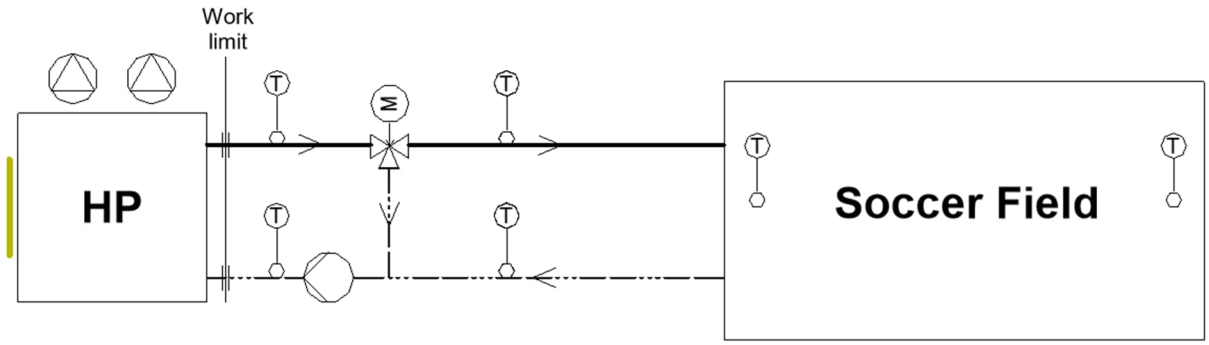

Figure 2.2 Heating of soccer field through air-to-water heat pump. Circulated water with 30% ethylene glycol antifreeze.

Work Limits
Work limits of the heat pump are at the inlet/outlet flanges on the cold and hot water side of the heat pump.
Number of parameters are left open for the Contractor to define for optimum performance of the heat pump (high COP and SPF).

3 PROCESS DATA AND PERFORMANCE REQUIREMENTS

3.1 Heat Pump input/output data

Table 3.1 Heat pump nominal capacity and input/output data at battery limits

Nominal heating capacity (phase 1): 350 kW							
Stream no.	Units	1		2		3	
Description		Ambient air		Supply from HP		Return to HP	
Media		Ambient air		Water w/30% et.glycol		Water w/30% et.glycol	
Temperature	°C	-7	Employer	40	Employer	25	Employer
Pressure	bara	TBD	Contractor	TBD	Contractor	TBD	Contractor
Flow rate*	kg/s	TBD	Contractor	6,5	Employer	6,5	Employer

*) for phase 1

3.2 Heat Pump Specifications

The Contractor shall supply detailed information on the heat pump plant offered. This shall include the following as a minimum:

For a) intermediate climatic conditions (see Figure 2.1)

- Supply temperature, +40°C
- Heating capacity, kW
- Water flow rate, kg/s
- Power consumption, kW
- COP

For b) design conditions, -7°C ambient air

- Supply temperature, +40°C
- Heating capacity, kW
- Water flow rate, kg/s
- Power consumption, kW
- COP

Exterior dimensions together with required service space

- Length, mm
- Width, mm
- Height, mm
- Unit weight, kg

Compressor(s)

- Type x Pcs
- Nominal output ea., kW

Refrigerant

- Type
- Charged amount, kg

4 DESIGN CRITERIA

4.1 Heat Source and Heat Receptor

Heat Source

The heat source of the heat pumps is ambient air.

- The temperature of the ambient air during the heating season, see average daily minimum in Figure 2.1

Heat Receptor

The receptor (sink) of the heat pumps is a closed-loop heating system (w/30% glycol antifreeze) for a soccer field.

- Supply temperature from heat pump to soccer field heating coils is 40°C, return temperature from soccer field 25°C.
- Flow of circulated water to soccer field is variable depending on the heat demand.
- At maximum HP output, all the circulated water will be routed through the condenser of the heat pump.

4.2 Material compatibility

All mechanical parts and seals in contact with the refrigerant and lubricating oils shall be compatible with the chosen refrigerant/oils as well as temperature and pressure levels.