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HEAT PUMP DESIGN

ASHP Design — Sizing, SCOP, Acoustic and Siting

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NOVTRIQ Academy · **Heat Pump Design** Lesson 2 of 8

Air source heat pumps are the most common type. Design well: high SCOP, low noise, acceptable space. Design poorly: lower performance, complaints, retrofit.

This lesson covers practical ASHP design.

Learning objectives

Remember	Key concepts.
Understand	How it works.
Understand	Standards.
Apply	Apply to projects.

1 · Sizing methodology

Heating load × design ambient temperature → required output at -2°C / -5°C / etc. Modulating units cope with part-load via inverter speed control. Oversize loses; undersize fails on coldest days.

2 · SCOP optimisation

Lower flow temperature → higher SCOP. Sizing emitters appropriately critical. 35°C flow ≈ SCOP 4; 55°C flow ≈ SCOP 2.5. Design for 35-45°C maximum where possible.

3 · Acoustic considerations

Outdoor unit dBA at 1m / 5m — manufacturer specs. UK: MCS Acoustic Calculator. Site away from neighbour bedrooms. Acoustic enclosure if needed (degrades efficiency). EN ISO 12102 testing.

4 · Siting and orientation

Air clearance for source flow. Defrost cycle drainage. Avoid recirculation of cold output air. North/east face often best (cooler ambient = bigger temperature lift, but minimises solar gain on unit).

5 · What this looks like on a real project

UK MCS Installer Standard

MCS Installer Standard sets sizing, siting, acoustic compliance for residential ASHP. RHI / Boiler Upgrade Scheme tied to MCS.

EU EHPA Quality Label

European Heat Pump Association quality label aligns to BS EN 14511. Vendor certifications across Europe.

UAE Heat pump for combined heating/cooling

UAE applications combine heating (winter shoulder) with summer cooling. Reversing valve allows single unit. Different sizing logic.

6 · Why this matters

ASHP design isn't 'pick a model from the catalogue' — it's sizing under realistic load profiles, acoustic compliance, siting for service access and noise. You know the trade-offs. That distinguishes specifying engineers from box-shifters.

Quiz

Your score 0 / 5

1. Heat pump flow temperature ideal:

a) 80°C

b) 35-45°C for high SCOP

c) 100°C

d) Below freezing

2. SCOP vs COP for design:

a) COP only

b) SCOP — annualised performance

c) Neither

d) Both same

3. Acoustic siting consideration:

a) None

b) Distance from neighbour bedrooms, recirculation of cold output

c) Aesthetic only

d) Color matching

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4. Defrost cycle:

a) Not required

b) Periodic to clear ice from outdoor coil

c) Forbidden

d) Daily

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5. Modulating ASHP advantages:

a) Fixed output only

b) Inverter modulation matches load, higher SCOP at part load

c) Higher noise

d) Cheaper

Answers (for print): 1b · 2b · 3b · 4b · 5b

Resources

PRIMARY SOURCES

- MCS Installer Standard.
- BS EN 14511 / BS EN 14825.

STANDARDS AND GUIDANCE

- BS EN ISO 12102 (acoustics).
- EN ISO 5801 (fan testing).

INDEPENDENT COMMENTARY

- Heat Pump Federation MCS Acoustic Calculator.
- EHPA Q label criteria.

← PREVIOUS LESSON
Heat Pump Fundamentals — How They Work and Why They Win

NEXT LESSON →
GSHP and WSHP — Borehole Design, Open vs Closed Loop