PUMP-UP

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Executive Summary

This Skill Blueprint formally operationalizes the 7 modular structural blocks established in the PUMP-UP Curriculum Draft into a standard European Qualifications Framework (EQF) matrix. It maps learning outputs into verified columns of Knowledge, Skills, and Responsibility & Autonomy (Competences) targeted primarily at EQF Level 4, which corresponds to fully autonomous professional HVAC practitioners capable of managing specialized installations and troubleshooting complex technical parameters.

List of Acronyms

Acronym	Meaning
EQF	European Qualification Framework
HP	Heat Pump
LCC	Life Cycle Costing

1. Introduction

The PUMP-UP project addresses the growing need for skilled HVAC technicians specializing in heat pump technologies. The skill blueprint structure provides a comprehensive training program that meets industry needs while enabling skills recognition through a micro-credential certification scheme.

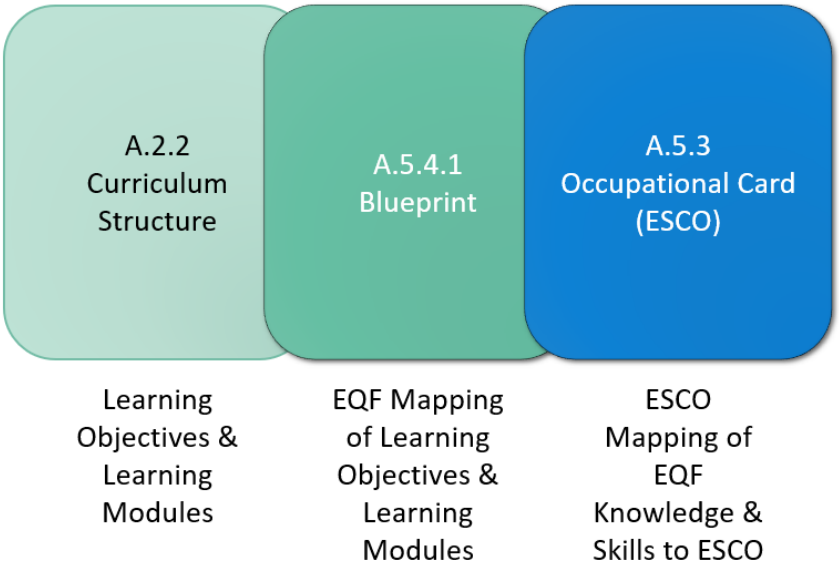


Figure 1: Context of this Blueprint

Figure 1 shows how this deliverable complements the deliverables A2.2 (Curriculum Structure) and A 5.3 (Occupational Card). While A2.2 provides the "bottom-up" view of the training program in terms of the Learning Outcomes that it shall achieve, A 5.3 provides the "top-down" view of what the job market requires. This deliverable A 5.3.1 establishes the vital link between these two important viewpoints, thereby also establishing their consistency and traceability.

2. Blueprint Framework Architecture & EQF Reference

To support micro-credentialing compliance across EU member nations, the PUMP-UP training objectives have been structured below following the official EQF parameters:

- **Knowledge:** Factual and theoretical understanding of technical fields (Core thermodynamics, regulations, and system architectures).
- **Skills:** Practical application of cognitive and manual dexterity (Sizing, execution, digital diagnostics, optimization).
- **Responsibility & Autonomy:** The ability to perform professional tasks independently, self-regulate quality parameters, and manage unpredictability on site.

3. Skill Blueprint

Module Scope	Knowledge Fields (EQF)	Practical Skills (EQF)	Responsibility & Autonomy
M1: Essentials of HP Technologies (EQF Level 4)	Comprehensive operational principles of Aerothermal (Air source), Geothermal (Ground source), and Hydrothermal (Water source) configurations. Thermodynamic cycles, performance ratios (COP, SCOP, EER), environmental sustainability, and decarbonization dynamics.	Accurately describe operational metrics; differentiate system applications based on building archetypes; evaluate ecological metrics and efficiency baselines.	Take responsibility for aligning equipment recommendations with localized environmental targets and technical efficiency codes.
M2: Site Assessment (EQF Level 4)	Methodologies for structural surveys, building envelope insulation analysis, transmission losses, local microclimates, and physical constraints affecting placement.	Conduct spatial structural surveys; execute preliminary structural analysis; accurately calculate and dimension pipe networks, volumetric loops, and pump capacities relative to insulation levels.	Autonomously select optimal system layouts based on empirical site data; minimize performance deficits caused by poor placement.
M3: System Design & Costing (EQF Level 4)	Advanced hydraulic balancing criteria, integration methodologies for multi-energy loops, control logic configurations, financial analysis, and lifecycle costing (LCC).	Design comprehensive heat pump layouts tailored to building loads; optimize sizing to achieve targeted cost-benefit balance; integrate ancillary hydronic components seamlessly.	Manage project engineering parameters; ensure optimized balance between capital expenditure (CapEx) and operational efficiency targets.

M4: System Installation (EQF Level 4)	Mechanical assembly standards, structural fastening, hydronic circuits, pressure management systems, and initial commissioning protocols.	Assemble, level, and anchor physical units; integrate mechanical and electrical connections; execute circuit balancing and systemic performance testing.	Supervise and execute hands-on system deployments ensuring full compliance with technical engineering blueprints and factory standards.
M5: Digitalisation & IoT (EQF Level 4)	Internet of Things (IoT) frameworks, remote logging architectures, cloud diagnostics, automated control algorithms, and smart grid communications.	Install and calibrate digital communication modules; interface with remote diagnostic software; interpret real-time telemetry datasets for system fine-tuning.	Independently manage digital deployment pipelines, utilizing predictive dashboards to maximize long-term energy performance.
M6: Troubleshooting & Maintenance (EQF Level 4)	Advanced root-cause failure vectors (refrigerant migration, cycle shorting, flow faults); preventative maintenance scheduling paradigms.	Isolate electrical and mechanical circuit defects; resolve control system logic errors; execute complex system component repairs and balance adjustments.	Formulate and implement critical preventative intervention protocols; take liability for restoring safe operation during systemic failures.
M7: Health & Safety (EQF Level 4)	National and European occupational health safety laws; F-Gas regulatory updates; specialized high-voltage handling; explosive gas classification (A2L/A3).	Apply pressurized containment protocols; safe handling, recovery, and logging of specific refrigerants; configure safety cutouts and high-voltage isolations.	Enforce absolute compliance with environmental and physical hazard safety frameworks on active commercial or residential jobsites.

4. Micro-Credential & Evaluation Strategy

To validate these competencies in an EQF-compliant format, the evaluation scheme utilizes a micro-credential methodology divided into distinct vectors:

- **Theoretical Matrix (Knowledge Verification):** Automated and proctored examinations featuring multiple-choice and complex scenario questions covering thermodynamics, safety codes, and costings.
- **Practical Matrix (Skills Verification):** Controlled practical laboratory assessments covering installation accuracy, vacuum tracking, refrigerant handling, hydronic balancing, and automated IoT calibration.
- **Project Matrix (Autonomy Verification):** A real-world capstone portfolio requiring the technician to independently execute a site assessment, compile a CAD installation design layout, execute costings, and configure operational logic parameters.

5. Conclusion

This skill blueprint provides a robust framework for training HVAC technicians on heat pump technologies. The combination of theoretical knowledge and practical skills ensures that participants are well-equipped to meet the evolving demands of the HVAC sector while supporting the green energy transition.