BIMplement

Towards a learning building sector by setting up a large-scale and flexible qualification methodology integrating technical, cross-craft and BIM related skills and competences.

www.bimplement-project.eu

Report:	D2.1 Methodology for a BIM enhanced Qualification Framework
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Version 1	January 31, 2018	First version
Version 1.1	February 5, 2020	Added an introduction to the BIMplement project based on suggestions from the project review.

1. Introduction to BIMplement

The overall methodology of BIMplement is based on the direct implementation of the results of the related BUILD UP Skills and Construction Skills projects in combination with a direct implementation of the methodologies combining quality assurance with large scale qualification schemes. This will be brought into practice on local and regional scale, by demonstrating, testing and validating the methodology and effectiveness of qualification schemes in real projects. The project phases in BIMplement are:

Development phase

BIMplement starts with the development of a BIM-enhanced Qualification Framework/methodology, executed on two dimensions:

- From the BUS and Construction Skills projects (such as BUS-NL, FR, LT and ES and H2020 PROF/TRAC) the approach for a EU Qualification Framework for performing nZEB professional activities will be adapted for:
  - Workers: filling the framework.
  - Professionals: validation of the PROF/TRAC Qualification Framework and if needed extending or adapting this.
- Adding the cross-trade aspects OR interdisciplinary Skills
- Adding the BIM-process when performing nZEB professional activities. This includes the mapping of which extra skills and competences are needed to optimise the results in nZEB-construction and renovation projects, linked to the professional activities and the workers and professionals involved.

An overall matrix will be developed in which the five phases in the construction process are discriminated (programme, design, elaboration, realisation, operation & maintenance), and the professions and specialism involves including the levels. This matrix will be filled in with the skills and competences need for each profession/specialism and the related training schemes to acquire the necessary competences. The EQFmethodology and guidelines for National Qualification Frameworks will be taken into account.

Implementation phase

The methodology and related qualification schemes will be implemented on a generic level for the subjects Ventilation and Air tightness. This matrix will be further elaborated for:

- the professions / specialisms and EQF levels involved in each phase;
- the required skills, competences and descriptors for the addressed technologies and technology components;

that are needed to enhance and ensure the quality of ventilation systems and air tightness. Next, this matrix will be linked to the available trainings.
BIM will be used as a universal carrier for all the information that is needed for the quality enhancement and related trainings. Moreover, in a next step, the matrix can be linked with 'real' projects, documented in BIM.

Pilots, demonstration and validation phase

Once elaborated, this Quality and Skills matrix will be made specific for each country involved in BIMplement. In the pilots reach involved country selects a number of projects in which the training and qualification, based on the matrix, will be executed and tested in practice. The pilots will be used for the verification of the matrix and the qualification schemes and give feedback to the previous steps. The pilots will also be used to test the value of BIM-enhanced tools to empower the different kinds of learning loops. Each project will start with a small scale local awareness campaign on the necessity of quality control and the role of new methodologies to achieve this such as BIM.

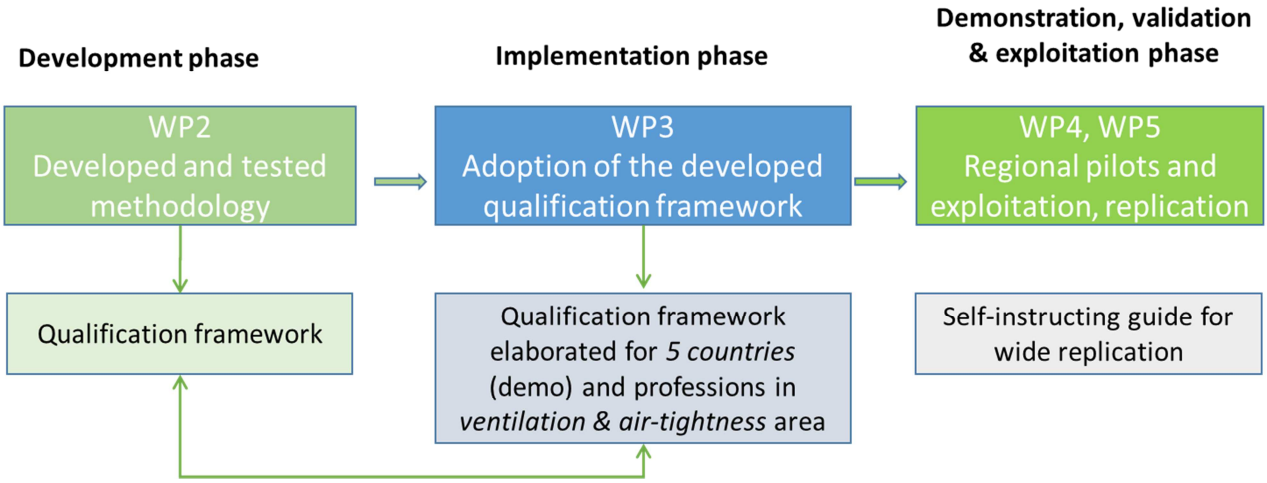
BIMplement aims for a mass large scale qualification implementation of the methodology in 30 – 35 construction and renovation projects in France, as a learning and replication case for the other countries, each executing about 5 projects. In total, the implementation and demonstration takes place in 50 projects.

Exploitation and replication phase

As the action is limited to training and qualification of professions involved in ventilation technologies and air tightness it is important to initiate and organize further exploitation and replication of the project to increase the number of skilled building professionals and craftsmen across the building value chain. An exploitation strategy should support this and will lead to a continuation after the project duration. This exploitation plan facilitates:

- the upscaling of the methodology to other /new topics
- sustaining the used content within existing tools
- upscaling the action to other countries by a free and open methodology, implementation services and a shared open development platform.

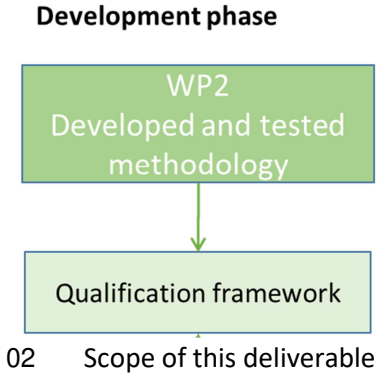
For a fast and effective exploitation and promotion the existing PROF/TRAC open training platform will be used. Another important issue is the collaboration and connection with European umbrella associations (like REHVA, ACE and Housing Europe) and suppliers through EU networks (like EUBAC, EVIA, EHPA etc.). These networks will take care for the further upscaling of the methodology to other/new topics for their products and concepts within the platform.



01 BIMplement project phases

2. Executive summary and introduction to D2.1

Objective of BIMplement workpackage 2 is to develop a BIM-enhanced Qualification Framework empowering nZEB construction and renovation. This deliverable documents the development iterations that where needed to come to the BIMplement Qualfication Framework. In the implementation phase the developed framework is applied and optimised for further use.
In the exploitation phase the Qualification Framework methodology will be documented in a self-instruction guide for replication in other countries and technical contexts.



The method is developed in three iterations during T2.1 'Drafting the methodology'. In this deliverable development of the methodology is described. In tasks T2.2. the result will be applied and validated in dialog with National stakeholders in Poland, France, the Netherlands, Lithuania and Spain (deliverable D2.2). As last step in T2.3 the methodology is finalised and documented in an easy to use userguide (deliverable D2.3). During development of the BIMplement Qualification Framework the team worked especially within the theme 'Ventilation'.

3. List of acronyms and abbreviations

Abbreviation	Meaning
Ad	Associate degree
Ba	Bachelor
BIM	Building information Model
CPD	Continuing Professional development
ECTS	the European Credit Transfer and Accumulation System
EHEA	Qualifications Framework of the European Higher Education Area
EQF	European qualification format
EQF-IP	EQF intake level for the educational or training program
EQF-OP	EQF output level for the educational or training program
IAQ	Indoor air quality
ISO/IEC 81346	International Standard 81346, published jointly by IEC and ISO defines classes and subclasses of objects based on a purpose- or task-related view of the objects, together with their associated letter codes to be used in reference designations
ISCO-08	The International Standard Classification of Occupations (ISCO) is an International Labour Organization (ILO) classification structure for organizing information on labour and jobs.
IN	Initial education
Ma	Master
PhD	Doctor of philosophy / Doctorate
PI	Post initial education
nZEB	Nearly Zero Energy Building

4. Definitions

Term	Meaning
Accreditation	Accreditation is a quality assurance process under which services and operations of (educational) institutions or programs are evaluated by an external body to determine if applicable standards are met. If standards are met, accredited status is granted by the appropriate agency. (*Wikipedia*)
BIM-axon	BIMAXON is a human-readable classification of BIM element properties. That would facilitate communication, help fill in gaps in the BIM process, and make it easier for every actor to obtain and understand the information that they need at any given moment. It is based on BIM uses and the needs of specific BIM actors, to ensure that deliverables are right for every drop point and to provide just the right set of information to each actor at every moment.
Building stages & RIBA	A building life-cycle consists of several stages. The RIBA Plan of Work is the definitive UK model for the building design and construction process.
Competence	The ability of an individual/organisation to do something effectively. It consists of a cluster of related abilities, commitments, knowledge, and skills that enable a person (or an organization) to act effectively in a job or situation.
Initial education	Training people receive before entering the labour market. In general, initial education is based on qualification documents and corresponding professional competency profiles. These qualification documents are drawn up nationally by the knowledge centres of the various professional sectors. Completing initial education results in the earning of a certain EQF level and a diploma, which has an unlimited validity.
Multilayered qualification	A multilayered qualification is a description of tasks that have to be performed to be effective. It consists of a layer with basic tasks and one or more layers of context specific layers. For example nZEB related tasks, BIM-related tasks or Indoor air quality (IAQ) tasks.
Occupation	An occupation is a a job or profession
Post-initial training	Training people receive after leaving initial training. In general, professional post-initial training is based on demand from market parties for retraining. These (short) trainings results most times in a certificate, which offers a limited validity. They do not result in the earning of a certain EQF level.
Profession	A profession is a specialized occupation characterized by profession specific education and training.
Qualification	A pass of an examination or an official completion of a course, especially one conferring status as a recognized practitioner of a profession or activity.
Qualification document	A qualification file describes what a participant in education should know and master at the end of a (intermediate vocational training) course. A qualification file describes the level of starting professional workers (school leavers).
Qualification structure	A formal system describing qualifications It makes visible which qualifications or sets of competences are sought by the labour market, education and society to secure a job, start further studies or participate in society.

<table>
<tr><th>Term</th><th>Meaning</th></tr>
<tr><td>Skill</td><td>The ability to do something well; expertise</td></tr>
<tr><td>Skill-level</td><td>
<table>
<tr><td>0</td><td>Not applicable / no knowledge and skills required</td></tr>
<tr><td>1</td><td>Has little knowledge and skills with respect to the relevant field / technology (mostly outside the own field of expertise). Understands basic principles and is able to take part in project team discussions.</td></tr>
<tr><td>2</td><td>Understands basic knowledge and has practical skills within the field / technology, is able to solve simple problems by selecting and applying basic methods, tools, materials and information (mostly outside the own field of expertise).</td></tr>
<tr><td>3</td><td>Has comprehensive, factual and theoretical knowledge and skills within the field / technology, is capable of solving standard problems within the field.</td></tr>
<tr><td>4</td><td>Has advanced knowledge involving a critical understanding of theories and principles and skills, required to solve complex and unpredictable problems in the field and is aware of the boundaries.</td></tr>
<tr><td>5</td><td>Has specialized knowledge and problem-solving skills, partly at the forefront of knowledge in the field, in order to develop new knowledge and procedures and to integrate knowledge from different fields.</td></tr>
</table>
</td></tr>
<tr><td>Specialism</td><td>A technology or application of several combined technologies specific set of tasks</td></tr>
<tr><td>Task</td><td>A piece of work to be done or undertaken.</td></tr>
<tr><td>Taxonomy</td><td>A taxonomy defines classes of objects and relations among them</td></tr>
<tr><td>Training Scheme</td><td>A scheme for teaching people skills in a particular field or profession</td></tr>
<tr><td>Trias Energetica</td><td>A concept that is based on 3 steps:
First, we need to limit energy demand through energy saving.
Second, renewable sources should be used to meet the remaining energy demand.
Only as last step fossil fuels should be used, as efficiently and cleanly as possible.</td></tr>
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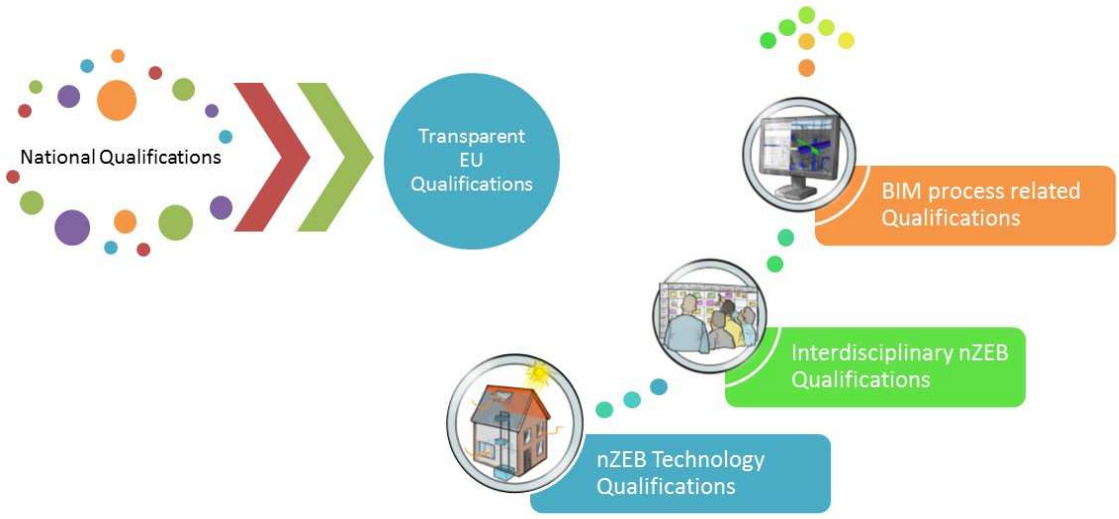
5. Summary of the development process

Introduction to the BIMplement Qualification Framework

The BIMplement Qualification Framework consists of a flexible methodology that allows definition of professional activities, related skills, required competences in order to achieve a desired quality in the field of nZEB. It is setup as a set of re-usable classifications. These classifications can be used in BIM-projects to describe items in a standardized, unified way and to link them to existing classifications that describe involved technologies, project-stages and involved actors.

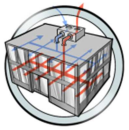
The BIMplement qualification framework is setup as a *multilayered qualification matrix*. It is composed out of tasks that have to be performed to be effective. It consists of a layer with basic tasks and one or more layers of context specific layers. For example nZEB related tasks, BIM-related tasks. If needed more layers can be added, for example for Indoor air quality (IAQ) tasks or Circulair Buidling tasks.



03 Example of several possible layers of classifcations

Kick-0ff

During the Kickoff-meeting in Paris (12 - 13 October 2017) a generic outline of the BIM enhanced Qualifcation Framework has been presented and discussed. This qualification framework outline is based on PROF/TRAC outcomes (website link) and serves as a quickstart for further BIMplement work.

nZEB Specialisms				**Professions/occupations involved**								
 Heatpumps	Short description of the specialism			Architect	E-Engineer	M-Engineer	B-Engineer	Proces manager	Bricklayer	Carpenter	E-installer	M-insstaller
Type of	**Proces-Phase**	**Tasks related**	**Classification**									
Water-water	Programme	Task 1	nZEB	x				x				
		Task 2	Interdisciplinary	x	x	x	x					
		Task 3	BIM									
		Task n										
	Design											
	Elaboration											
	Realisation											

	Operation											
	Maintenance											
Water-air	Programme											
	Design											
	Elaboration											
	Realisation											
	Operation											
	Maintenance											
Air-Air	Programme											
	Design											
	Elaboration											
	Realisation											
	Operation											
	Maintenance											

Table 1: Generic qualification framework outline based on PROF/TRAC

After the kick-off meeting the generic outline has evolved in three iterations.

Iteration I

For this iteration ISSO worked out a small number of professional activities within the PROF/TRAC Qualification Excel-format, related to the specialism Ventilation of residential buildings. After discussion the results were extended by:

- Exploring the possibility to store the Qualification as a set of Classifications in BIMaxon. BIMaxon is a tool for creating and linking Classifications to BIM-models. Working with this tool makes it possible to work with existing BIM classifications such as ISO/IEC 81346
- The list of involved professions both with several blue and white collar professions

Iteration II

In the second iteration classifications in BIMAXON were applied and some additional BIMplement classifications have been proposed. This was done to find out if we can work out the BIMplement Qualifications as a set of re-usable classifications. With as result a multilayered qualification. The result is used to reformat and extend the results of the first iteration.

Iteriation III

The third iteration was split into two parts. First a worksession on 28th of November 2017 and second a discussion of results on the 12th of December 2017. This last session was also used as a kick-off for the work on Task 2.2.

For the worksession on the 28th of November 2017 a proposal for 'professions and occupations names and codes in BIMplement' was written and the results of the second iteration where worked out in more detail.
Also after the worksession ISSO, IVE and ASTUS wrote out a new example for another task.

Based on the final discussion on the 12th of December 2017 ISSO aggregated all the results into one final outcome of the exercises done while developing the methodology.

6. The BIMplement Qualification Framework

The developed BIMplement Qualification Framework consists of several existing taxonomies that are linked to tasks that needed to be performed to deliver nZEB Quality empowered with the use of BIM. Delivering nZEB is the objective and BIM is a tool/instrument to reach that goal.

From existing taxonomies we use:

1. the for BIMplement extended and interpreted ISCO-08 for describing involved persons. The extended and interpreted ISCO-08 is added in Annex III
2. the RIBA-stages [https://www.ribaplanofwork.com/]

   S1 -S7 stages (White collars)
   S5 – S7 stages (Blue collars)
3. ISO/IEC 81346 for connecting to Functional & Technical systems such as the Ventilation system

For BIMplement the following taxonomies are added

1. BIMplement (Task classes) for subtasks
   - BAS Basic task (we do not detail these tasks, they are only mentioned)
   - nZT nZEB Task (all tasks concerning application of nZEB technologies)
   - BIT BIM task (all tasks to BIM empower the work to be done (more efficient))

   Aspects of quality control are integrated into the task descriptions
2. BIMplement (What To Classes) for didactical task descriptions
   - K1 a list of what to know
   - K2 a list of what to understand
   - K3 a list of what to be able to do

By using these taxonomies tasks needed to realise and maintain nZEB-Quality are described.

Connections to persons involved

In the work done in Task 2.1 it was decided not to connect the tasks and subtasks to persons by using the ISCO-08. The decision criteria for persons responsible for a completion and quality level achieved within certain task depends on a project size and company policy.

7. Annex I Results discussed & Meeting minutes

Iteration 1

- BIMplement T2.1 First iteration.docx
- BIMplement discussion in 1st iteration T2.1.pdf
- BIMplement T2.1 First iteration-Aggregated results.docx

Iteration II

- BIMplement T2.1 Second iteration - multilayered qualification.docx
- BIMplement discussion in 2nd iteration T2.1

Iteration III

- BIMplement worksession in 3th iteration T2.1
- BIMplement T2.1 Proposal for professions and occupations names and codes in BIMplement - Final draft.docx
- BIMplement discussion in 3th iteration T2.1.docx
- BIMplement T2.2-multilayered qualification AGGREGATED RESULTS T2.1.docx

8. Annex II Aggregated results from T2.1

In this annex, results from the performed iterations are integrated into a set of tasks that have to be performed when applying a ventilation system in an nZEB building (a domestic dwelling) while using BIM to deliver more quality in an efficient way.

BIMplement (Task classes) for subtasks

BAS	Basic task	(we do not detail these tasks, they are only mentioned)
BIT	BIM task	(all tasks to BIM empower the work to be done (more efficient))
nZT	nZEB Task	(all tasks concerning application of nZEB technologies)

Aspects of quality control are integrated into the task descriptions

S0 STAGE 0: Strategic Definition (BIMAXON-STAGE)

1. Perform site analysis
    a. site meteorological data
    b. local risks (air, soil)
        i. pollution (air, soil)
        ii. radon
2. Find out client's need and requests
    a. in terms of NZEB (Quality)
    b. in terms of BIM files
3. Determine if decentral balanced ventilation fits into the project definition
   Choice of the type of ventilation to be implemented in order to obtain nZEB building

S1 STAGE 1: Preparation and Brief (BIMAXON-STAGE)

1. Determine ventilation requirements
2. Determine noise requirements for the room in question
3. Determine possible combination with space heating
4. Determine list of stakeholders (clients, architect, design office, control office, constructors
5. Determine list of BIM stakeholders
6. Check available technical data and documentation
    a. technical data
    b. BIM data, ifc products & classifications

S2 STAGE 2: Concept Design (combined with stages 3 and 4 difficult to split tasks) (BIMAXON-STAGE)

1. Determine the needed airflow
2. Check if the airflow is higher than the legal requirements
3. Re-assure the type of ventilation to be implemented in order to obtain NZEB building
4. Determine location of the principal components in the building

S3 STAGE 3: Developed Design (selecting components & manufacturers)

1. Choose a ventilation device based on:
   - the type of heat exchanger (thermal or enthalpy exchanger)
   - wished combination with heating system or not
2. Determine the number of devices needed to provide the needed capacity

3. Determine the location(s) of the decentral balanced ventilation units based on:
   - the wall must be an outside wall
   - the wall must have enough strength for bearing the unit
   - the wall must be heavy enough (a least 200 kg/m2) of stiff enough to prevent vibrations
   a. interpretation of drawings, properties of the outer wall in terms of structure and composition
   b. check features and dimensions of decentralized ventilation units (clash detection)
4. Determine the type of outside grill(s) (round or brick form)
5. Determine the size (diameter) of the hole(s) to be drilled in the inner layor of the wall (part until the insulation)
6. Determine the size (diameter) of the hole in the outside wall if the outside grill is not brickform
7. Provide a connection to the net of electricity (power supply 230 V)
   Check information about power connection
8. If more decentral balanced ventilation units are necessary a multi-wired connection between the units is needed for control purposes.

S4 STAGE 4: Technical Design

1. Perform calculation of the air network
   a. minimize the loss of pressure
   b. Check the coherence with the thermal (nZEB) calculation
2. Check easy access to the ventilation system
3. Draw the air pipes network, and check there is no conflicts with the structure or other networks
4. Draft the technical implementation file (contains 3 chapters (in France))
5. Define a maintenance plan
   a. Define preventive, corrective and predictive maintenance actions
   b. Establish calendar for maintenance actions
   c. Determine actions that must be carried out by professionals or by users themselves
   d. Create the Building Log Book (Maintenance Instructions)

S5 STAGE 5: Construction

1. Field / manage tracking Check if this is the right moment in the planning
2. Safety planning Check if safety measures are in place
3. Create wall passages for supply and exhaust air
   a. Determine the location where the system must be mounted
      i. check how many connections have to made to the system (supplier documentation)
      ii. determine the needed space for the system (supplier documentation)
      iii. determine stiffness of the wall
      iv. check if there are cables or tubes in the wall
   b. Mount the drilling template
      i. Check with Augmented Reality measuring if the drilling template is place correct
   c. Drill needed holes :Ø 300 – 350 mm in the wall

4. Install ducts in the wall (air and water tight)
    d. Realize air- and water-tightness
        i. Make photo's between the steps that have to be performed to realize air- and water- tightness
        ii. Measure the airtightness with a Sound-brush
5. Mount external grills
6. Mount / install a decentral balanced ventilation unit
7. Document installed quality (following protocol)
8. Measure and adjust airflow(s) according to the design
9. Interconnect decentral balanced ventilation units
   (when there is more than one unit in the space)
    a. Measure and adjust airflows
    b. Document the settings made

S6 STAGE 6: Handover Construction and Close Out

1. Check overall Quality
    a. location of the elements
    b. pipes slope and diameter
    c. water and air tightness
    d. cleaning during the works
    e. acoustic insulation
2. Pilot testing
    a. Check necessary flow with the minimum engine speed
    b. Check noise production
        i. Of the ventilation unit
        ii. In the canal-system
        iii. At the ventilation grilles
3. Create As-built records
    a. Check if all to be documented actions are documented properly

S7 STAGE 7: In Use
Noting described yet

Example of a didactically detailed task

Realize air tightness around exterior ventilation devices

K1: what to know (that air and water tightness is needed)
K2: what to understand (why air and water tightness is needed)
K3: what activities to be able to

1. Realize a Mortar finishing for the pipe sheat
2. Protect the sheath with
    a. bituminous felt OR
    b. lightly expandable foam
3. Place expanded polythene around the vent (interior and exterior)
4. Outside : place a PU or silicone seal
5. Inside : place an acrylic seal

9. Annex III Extended and interpreted BIMplement ISCO-08

Classification system: ISCO-08 Code: ISCO on http://bp.ics.infinibim.com/classifiers/43/tables/214

ISCO-08	Name	Description
Construction		
2142	Civil Engineers	
2142	Structural Engineers	Deals with statics, mechanics, solid mechanics, and with the conception, analysis, design and construction of components or assemblies to resist loads arising from internal and external forces.
HVAC en Energysystems		
2144	Mechanical Engineers	Designer of materials and systems for HVAC and sanitary equipment, considering the limitations imposed by practicality, regulation, safety, and cost.
2142	Energy System Engineer	Designer of materials and systems for HVAC and sanitary equipment, considering the limitations imposed by practicality, regulation, safety, and cost. In charge of energy consumption optimization
1330	Building Automation Engineer ICT technology services managers	Designer of building automation systems, system engineer / system integrator, considering the limitations imposed by practicality, regulation, safety, and cost
2143	Environmental engineer	In charge of energy consumption optimization, as well as environmental impacts (water, air, comfort, health ...)
Electrical systems & domotics		
2151	Electrical Engineers	Designer of power, lighting, (data and or communication installations), considering the limitations imposed by practicality, regulation, safety, and cost.
1330	ICT Engineer	Designer of data and or communication installations, considering the limitations imposed by practicality, regulation, safety, and cost. + GTB Consulting with clients, management, technicians to assess the needs and system requirements Directing the selection and installation of ICT Overseeing security of ICT systems
Construction management		
1323	Construction manager/ Manager of Building Process	The person responsible for economy, health, delay, quality assurance during on-site construction works in the realization of nZEB buildings Interpreting architectural drawings and specifications Preparing tenders and contract bids Ensuring adherence to building legislation and standards of perofmance, quality, cost and safety
1323	Project Manager	The person responsible for the planning, execution and closing of any (nZEB) building project and contracts. Negotiating with building owners, property the construction process to ensure projects are completed on time and within budget Building under contract, or subcontracting Coordinating, operating and implementing the work programme for the site. - Also in charge of the realization of the as-built building files. Overseeing the selection, training and performance of staff and subcontractors. Arranging inspections by relevant authorities
3123	Building construction supervisor	Coordinate, supervise and schedule activities of workers engaged in the construction/renovation

1211	Cost Expert, Cost Engineer Finance manager	The person responsible for financial aspects during planning, execution and closing of any (nZEB) building project. (Not meant is financing of the project)…. Including the additional unexpected work
Facility management		
No code	Facility Manager	The person responsible to maintain the real estate as it was realized at the end of the nZEB building process (including facility management).
No code	Technical Energy Engineer	Person responsible for management, monitoring, energy optimisation and improvement of operation of facilities.
Financing and procurement		
1323	Procurer, Chief Procurement Officer 1323 Construction manager (also 1211 Finance manager)	The person responsible for facilitating the process of nZEB tenders and (sub)contracts c) negotiating with building owners, property the construction process to ensure projects are completed on time and within budget d) preparing tenders and contract bids h) building under contract, or subcontracting specialized building services
No code	Project Developer	The project developer takes responsibility for the associated risks involved in the building process for the customer and hands over the project to the tenant / buyer after completion and use of the building
Architects		
2161	Building Architects	Architects investigate, design and oversee the implementation of buildings and urban spaces taking into account functional, architectural, aesthetic, structural, technical, regulatory, cost and contextual requirements with due regard to public health and safety. Architects' work takes account of social factors and obligations and addresses the relationship between people and buildings and buildings and the environment (definition ESCO).
BIM		
No code	BIM manager	Coordinate the BIM correspondants check the different trade BIM model verify the compatibility of the different trade BIM models assemble the as-built final model
	Company BIM correspondent	Realize, modify and adapt the company BIM model (companies that are requested to realize a BIM model by the client)
2161, 2142, 2144	BIM engineer	Realize, modify and adapt the technical design office BIM model
2161	BIM architects	Realize, modify and adapt the architect BIM model,
Technicians and Associate Professionals		
3112	Civil Engineering Technician	Inspecting buildings and structure during and after construction/renovation to ensure they comply with nZEB building laws and approved plans, specifications and standards as well with rules concerning quality and safety of buildings
3112	Building inspector	ensuring compliance inspecting buildings and structures during and after construction to ensure that they comply with building, grading, zoning and and standards, as well as with other rules concerning quality and safety.
3113	Electrical Engineering Technicians	Assist the electrical engineer
3114	E-installations service mechanicElectronics engineering technicians	Assisting in design, development, installation, operation and maintenance of electronic installations and systems. Supporting electronics engineers
3115	Mechanical Engineering Technicians	Designing and preparing layouts of machines and mechanical installations, facilities and components, according to the specifications
No code	Engineering service	From BUS-NL

	mechanic	
Craft and Related Trades Workers		
7111	House Builders	Decide to realize a building, or realize it for a client Pilote the constructions, draft the general specifications, hire the architects and the different contractors Is responsible, in front of the client, for the perfect realization of the building Contrarily to most owner/client, house builder is a full time occupation.
7112	Bricklayers and Related Workers	Implement different type of elements for wall building, such as burnt bricks, concrete blocks, stone, but also, earth blocks, straw, wattle and daub, adobe, ...
7114	Concrete Placers, Concrete Finishers and Related Workers	Realize reinforced concrete walls, panels, beams, slabs, posts, ….
7115	Carpenters	Realize wooden structures for walls, floor, partitions, roof structure, ...
7115	Joiners	Realize small elements such as doors, windows, furniture, ...
7121	Roofers	Realize the covering of roof, openings in roofs,
7123	Plasterers	Implement the finishing interior layer of walls and partitions, including the secondary necessary supporting structure
7124	Insulation Workers	Lays insulation inside wooden beam structures, roofs, slabs, including air-tightness films in relation with plasterers
7122	Tile layer	Lays tile on floors and walls
7125	Glaziers	Lays glass within windows is disappearing because windows are now , in general, manufactured in factories
7126	Plumbers and Pipe Fitters	Install water pipes for fresh and used water, sanitary devices, (often also heating engineer)
3115	Heating engineer	Install pipes for heating system, install heating devices (boiler, water heater, ...) (often also plumber)
7127	Air Conditioning and Refrigeration Mechanics	Install air-conditioning / refrigeration devices
No code	Cooling service mechanic	From BUS-NL
7131	Painter and related workers	Realize the finishing layers of wall, interior and exterior : paint, rendering, coating,
7411	Building and Related Electricians	Realize the building wiring, including the data collectors and electric devices (ex : ventilation)
7412	Electrical Mechanics and Fitters	??
No code	Ventilation fitter	New trade, arriving on the market : give advice on the type of ventilation to be chosen, on the installation plans (namely the position of ventilation and air duct …) lays the air ducts and the ventilator, fixes the air entry and extract, controls the installation quality
No code	General/works foreman	Responsible of a blue collar team (around 10 for "small buildings")
No code	ceiling installer	Install false ceilings
No code	Works planner building sector	In charge of the structural work planning/organization between the different stakeholders/companies
No code	Works planner installation sector	In charge of the finishing work planning/organization between the different stakeholders/companies
No code	maintenance	In charge of the maintenance of buildings - owner or inhabitant - electrical worker - plumber

10. COLOFON

BIMplement

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The information in this publication does not necessarily represent the view of the European Commission.