

# TERMS OF REFERENCE FOR PROVIDING PROFESSIONAL SERVICES

## I. Information on the task

Task Description:	Providing professional services on developing design package for seismic upgrades, energy efficiency improvements and reconstruction of 20 kindergartens in administrative districts of Yerevan
Duration	5 months
Project:	“De-risking and Scaling-up Investment in Energy Efficient Building Retrofits” UNDP-GCF Project
Location:	Yerevan, Republic of Armenia

### 1. General information

The “De-risking and Scaling-up Investment in Energy Efficient Building Retrofits” UNDP-GCF Project supports the Municipality of Yerevan in implementing the “Yerevan Energy Efficiency (YEE) Project” aimed at promotion of energy efficiency (EE) improvements in municipal level.

In the first stage (referred as “pilot phase”, the Project will focus on EE measures in public buildings and in the second phase on the residential buildings, depending on the results of a feasibility study.

### 2. Sector information

#### General Description

According to the Armenia Development Strategy for 2014 – 2025, the promotion of EE in all sectors is a key priority for Armenia and existing legislation supports implementation of energy-saving measures. Armenia is relatively poor in natural resources and covers the major share of its energy needs by fuel import. This dependence on energy imports results in serious consequences on the countries’ external accounts and imposes a risk towards macroeconomic sustainability. The cities in Armenia including capital city Yerevan has joined the Covenant of Mayors and has taken commitments for reducing the energy consumption by 20% by 2020. The improvements in EE would help the municipalities to reduce energy related expenses and contribute to meeting National Energy Efficiency Programme.

The potential for EE upgrades in the building sector has been estimated to be around 40% and Armenia is no exception. The main building stock in Armenia was constructed before 90’s and is in a deteriorated status, thus thermal and seismic characteristics of buildings need to be assessed and upgraded. The Yerevan Municipality in 2017 has initiated “Yerevan Energy Efficiency (YEE) Project” through a loan scheme provided by European Investment Bank and grant resources from UNDP-GCF project and E5P.

Within the framework of this initiative, 20 kindergarten buildings have undergone seismic assessments and detailed energy audits, ordered by UNDP in the frames of technical assistance to the YEE project.

Relevant findings, conclusions and reports have been developed. These reports, as well as the Architectural Planning Technical Scope, will be shared with the selected contractor(s).

### 3. Scope of work, key tasks and activities of the Design Company

#### Scope of work

The general task is to develop the full design package of reconstruction of 20 kindergartens in Yerevan, including the measures for seismic upgrades and EE improvements.

The contractor has to comply with the current relevant legislative and technical regulations in its scope of work, including but not limited to:

- RA Urban Development Minister’s N87-N resolution, dated 24.03.2014 “On approval of the RACN 20-06-2014, Restoration, rehabilitation and strengthening of buildings and structures”;
- RA Government N392-N Decree, dated 16.02.2006 “On Approval of the Procedure for Accessibility to Social Transport and Engineering Infrastructures for People with Disabilities and Population groups with limited Mobility”;
- RA Government’s adjacent State Committee on Urban Development Chairman’s N43-A Decree, dated 05.04.2018 RASR 23-101-2017 “On Approval of the Set of Rules for Accessibility of Buildings and Structures for People with Disabilities and Population groups with limited Mobility”;
- RA Government N1504-N Decree dated 25.12.2014 “Implementation of energy saving and improving EE measures at state-funded facilities’ reconstruction, renovation projects”.

The design documents shall be developed for the facilities indicated in the table below, grouped in 7 LOTs, with 3 kindergarten per each 6 LOTs and 2 kindergartens in 7<sup>th</sup> LOT. Financial proposal(s) shall be submitted according to LOTs, with breakdown per each kindergarten.

Tender applications can be submitted for one or more LOTs. Respective LOTs and kindergartens are required to be indicated in both technical and financial proposals.

#### Allocation of buildings to Lots

LOT	No	Type of Construction	Address	Building space m <sup>2</sup>	Basement
1	48	Raised floor slabs	Ajapnyak, Norashen 34/1	2477	-
	49	Raised floor slabs	Ajapnyak,16 District	2477	-
	74	Stone-bearing walls	Erebuni, Jrashen 1	427	-
2	83	“ИИС-04” series RC prefab structure	Malatia Sebastia, Andranik 97	3400	+
	157	Stone-bearing walls	Qanaqer-Zeytun, Z. Sarkavag 14	1427	+
	75	Stone-bearing walls	Erebuni, Shorbulakh (Mushavan)	454	-
3	78	“ИИС-04” series _ RC prefab structure	Malatia Sebastia, Babajanyan 139	2960	+
	81	“ИИС-04” series RC prefab structure	Malatia Sebastia, Kurghinyan 11/5	1404	+
	156	Stone-bearing walls	Qanaqer-Zeytun, M. Avetisyan 2 <sup>nd</sup> block	806	+
4	138	Stone-bearing walls	Shengavit, Gharibjanyan 104	850	-
	47	Stone-bearing walls	Ajapnyak, Bashinjaghyan 2 Alley, b. 14	1760	+
	71	“ИИС-04” series RC prefab structure	Erebuni, Nor Aresh 2, b. 45	2850	+
5	22	“ИИС-04” series RC prefab structure	Arabkir, Griboyedov 2/2	2030	+
	23	Stone-bearing walls	Arabkir, Vratsakan 19	1810	+
	109	Stone-bearing walls	Nor Nork 2 District, Bakunts 6	1214	-
6	108	Stone-bearing walls	Nor Nork 2 District, Bakunts 1, 7th Lane	1785	+
	129	Stone-bearing walls	Shengavit, H. Hovsepyan 17	860	+
	161	“ИИС-04” series RC prefab structure	Qanaqer-Zeytun Z. Sarkavagi 145a	2465	+
7	93	“ИИС-04” series RC prefab structure	Malatia Sebastia, Raffi 69	3400	+
	36	Stone-bearing walls	Ajapnyak, Bashinjaghyan 2 Alley, b. 14	1760	-

\* Building area can differ from the actual figures, (basement surface areas are not considered).

## Key tasks and activities

In the frames of providing professional services, the contractor must perform the following activities:

1. Perform ***detailed measurements*** and design accordingly based on factual dimensions for the buildings per LOTS;
2. Develop design documents for seismic upgrades, according to the seismic survey results;
3. Develop design documents for EE improvement, considering the energy audit results;
4. Develop design documents for buildings' reconstruction;
5. Develop design documents of solar systems' (PV and hot water) installations, based on the energy audit results;
6. All structural components and building elements, as well as EE improvement measures are indicated in seismic survey and energy audit reports respectively. The reports/summaries will be shared with the selected contractor(s).
7. Conduct "Author Supervision", in accordance with RA Urban Development Minister's N143 resolution (28.09.1998) during the construction phase.

## 4. Components of the Design

Development of working drawings should be in compliance with the Order 128-N of 11.09.2017 issued by the Chairman of State Urban Development Committee under the Government of the Republic of Armenia, and Annex 1 to the RA Government Decree No 879-N made on 23.06.2011.

1. *General description;*
2. *Master plan;*
3. *Floor plans for all levels, including basement and technical floor (if available) showing all elements regarding structural reinforcement and conventional buildings' refurbishments (reinforced-concrete structural elements, metal structures, details of metal structures, wooden structures, etc.);*
4. *The section drawings of all the main elements of the building façade including: the roof layers, ceiling, exterior walls, doors and windows, basement units and other important connections and joints;*
5. *Detailed drawings for installation and fixing of thermal insulation layers with walls, ceilings, floors, windows and doors as described in Energy Audit Reports;*
6. *Detailed drawings of the external walls and associated components, such as piping, drainage pipes and gutters, rainwater down pipes, brackets, hangers and holders, telecommunication accessories, etc., these drawings should be complemented with the relevant floor plans including solar hot water systems' piping*
7. *Detailed drawings of connections to drainage, sewage or sanitation wells or other appropriate solutions*
8. *Single line diagrams on rainwater and wastewater drainage horizontal and vertical systems*
9. *Detailed drawings and single line diagrams of HVAC systems and their thermal insulation including floor plans and section drawings as stipulated in the energy Audit Reports*
10. *Detailed drawings and single line diagrams of grounding and lightning protection*

11. *Detailed drawings and single line diagrams of internal and external lighting as stipulated in the Energy Audits Report*
12. *Detailed drawings and single line diagrams of fire-fighting systems*
13. *Detailed drawings and single line diagrams of gas supply systems*
14. *Detailed drawings and single line diagrams of voice-data networks and CCTV*
15. *Detailed drawings and single line diagrams of the solar hot water systems as stipulated in the Energy Audit Reports*
16. *Detailed drawings and electrical single line diagrams of the PV systems as stipulated in the Energy Audit Reports*
17. *Technical descriptions of all structural reinforcements' and conventional building refurbishments' works*
18. *Technical descriptions of all MEP systems to be implemented (HVAC, Plumbing and electrical, firefighting etc.) as described in Energy Audit reports*
19. *Technical specifications of all equipment and materials to be used during construction, specifically: detailed description of materials, equipment and installations related to structural reinforcement, conventional buildings' refurbishments and EE improvement (thermal insulation materials, windows, doors, lighting and HVAC systems, PVs and solar hot water system). The Technical Specifications should also cover all the MEP equipment and material referenced above, as well as detailed method statement for the construction works of each system, equipment or material;*
20. *Environmental protection;*
21. *H&S plan;*
22. *Engineering and technical measures for civil defense and prevention of emergency situations;*
23. *Organization of the construction works with the estimated duration/schedule of civil engineering works (demolishing and dismantling plan, environmental protection measures, fire protection measures, measures for ensuring access to persons with limited mobility, EE and energy conservation measures).*
24. *Cost estimates and bill of quantities - the detailed bill of quantities (BOQ) for each kindergarten should be submitted separately. Furthermore, a breakdown of the bill of quantities (cost coding) for each kindergarten should be in line with the divisions in Annex 1, via submission of a separate BOQs for energy efficiency upgrades and general repairs/reconstruction works. (Details shall be clarified with the Yerevan Municipality.)*
25. *Brief descriptions and specifications of the main construction materials, products, installations and structural elements;*
26. *All descriptions and specifications (demolishing, rehabilitation works, water and sewage systems, etc.) must be in tabular format showing the individual volume of work for each numbered space/room and the total volume.*

## **The design for renovation of the building must include the following works:**

### **Seismic upgrades**

Enhance seismic condition of the building, in compliance with solutions and recommendations noted in the seismic survey report and current regulations/norms.

### **Accessibility**

In compliance with RA CN "IV-11.07.01-2006" and RA SR "23-101-2017", accessibility for disabled with limited mobility should be provided for the building.

### **Roof**

- Removal of the old cover in pitched roofs and construction of the new galvanized sheeting on new wooden joists/rafters (if technically and economically feasible, turn pitched roofs into flat ones while discussing such solution with the client).
- Reinforcement and repair of the existing roof structural elements according to the requirements of the RA Construction Norms.
- While selecting the timber for the roof due regard should be paid to the dimensions of materials available in the market.
- Proper installation of vapor-barrier and thermal insulation layers.
- Treatment of the entire roof timber with antiseptic and fireproof coatings.
- All ventilation pipes must be above the roof cover to comply with the effective standards and norms. The combined ventilation pipes must be thermally insulated and protected by galvanized sheeting mounted above the roof.
- All ventilation ducts in the attic level must be insulated by thermal insulation layer.

### **External walls**

- Remove all devices and equipment mounted on the external walls, including: metal ladders for building maintenance, components of air-conditioners, pipes, electrical appliances, etc.
- Apply thermal insulation layer on external walls to comply with the recommendations of the energy audit report.
- Dependent on the thermal insulation material type, provide detailed description of the technology, insulation layers and sequence of works and the specification of the respective materials to be used.

### **Windows and doors**

- Dismantling and storage of old windows; installation of new energy-efficient windows to comply with the recommendations of the energy audit report; at least one window with a compound lock, mosquito net, and an air inlet/vent in each room. *In recent years some of the kindergartens have been partly renovated, some or all windows have been replaced. The adjustment and/or replacement of such windows, as well as reducing the opening sizes must be agreed with the client.*
- Installation of the internal windowsills, tightening and balancing.
- Installation of external basalt windowsills.

- Dismantling of external doors; installation, adjustment and air tightening of the new aluminum framed doors with embedded thermal breaks. Additionally secondary doors, as a thermal buffer, in the entrance area should be foreseen.
- Dismantling (storage) of the internal doors; installation, adjustment and air-tightening of the new doors;

### **Heating, ventilation, and water supply systems**

- Inspection, repair, and testing of the existing heating systems. Where needed - replace existing radiators by new ones with thermostatic regulating valves; design a new heating system (complete or partial) depending on recommendations of the energy audit report.
- Inspection and repair of the ventilation (inlet and outlet) systems; design new inlet and outlet systems (complete or partial) depending on recommendations of the energy audit report. In case of impossibility for application of inlet systems, air vents should be foreseen for 50% of bedroom windows;
- Inspection and (where necessary) repair, demolish, construct new and test internal and external networks for the cold/hot water supply and sewage systems.

### **Internal repair works**

- Repair, demolish, construct new sanitary rooms where necessary
- Dismantling of sanitary equipment; installation of new ones (the sizes should be selected for specific age groups).
- Examination of the floors in the rooms and corridors of the Kindergarten and upon defining defects/areas for improvement agree on the solutions with the client.
- Examination of the walls, ceilings of the corridors and available spaces; repair of the plaster finish surface and, if necessary, remove the old plaster and make a new layer by using good quality finishing materials.
- All materials used for interior finishing and floors must be environmentally friendly and comply with the fire safety, sanitary and general hygiene and other currently effective requirements (selection of the materials must be agreed with the client).
- Install new banisters in the stair enclosures.

### **Electricity supply and lighting**

Inspection, repair, removal and replacement (where needed) of wiring and electrical devices; dismantling of old luminaires and replacement by new luminaires with LED bulbs (color temperature  $\leq 4,000$  °K) of estimated light output; partial and general testing of the networks.

### **Solar thermal and PV systems**

- Solar thermal and PV systems should be installed in locations where they will get full sunlight and not be shaded;
- Special care has to be taken to ensure that the exterior waterproof envelope of the roof is not compromised which could lead to leaks and rain penetration (in particular, where fixings, cables and pipes penetrate the roof);

- If the solar system is to be located on the roof of the building(s), roof structures must be designed to accommodate the additional dead loads (static load) and live loads (dynamic load) of the PV and/or ST system. Orientation and tilt angle of the solar systems should comply with the values noted in the energy audit report.
- For solar thermal systems, location for controllers, heat storage system, shutoff valves, and other equipment should be identified. All the necessary plumbing plans and pathways for water piping to link the solar collector, the heat storage system, and the rest of the building's hot water system should be provided.
- For PV systems, installation scheme of the modules, fittings and fixtures, framing, location of inverters and auxiliary equipment, as well as wiring diagram should be provided.

#### **NOTES:**

All the engineering components of the design, such as seismic retrofit, HVAC, Lighting, etc. should be justified via detailed calculation/documentation which should be provided upon request.

All materials, equipment and installations related to energy-efficiency and energy-saving must be designed to strictly comply with the technical recommendation and other specifications recommended in the energy audit report as well as should be guided by the "Technical solutions for the thermal insulation of the building envelopes for the newly constructed and renovated residential, public, and industrial building in the Republic of Armenia" Advisory Handbook, while agreeing such solutions with the client.

The Handbook is available on [http://www.nature-ic.am/wp-content/uploads/2013/10/Advisory\\_Handbook\\_on\\_Insulation\\_2013.pdf](http://www.nature-ic.am/wp-content/uploads/2013/10/Advisory_Handbook_on_Insulation_2013.pdf)

In recent years, some of the kindergartens have been partially renovated. The possible renovation of said sections should be agreed with the client paying due regard to the recommendations of the energy audit report.

#### **5. General provisions**

- Implement the design works for the building premises leased/occupied/privatized only upon the consent of the client and staff of the Yerevan Municipality.
- Include in the working drawings all possible works necessary for complete renovation and regular operation of the kindergarten:
  - a. submit the scope/volume of works substantiated by the findings of the detailed study;
  - b. elaborate the design in accordance with the requirements of all construction norms currently effective in the Republic of Armenia;
  - c. Submit the warranty period (term) requirements for the separate parts (elements, etc.), and used materials of the contracted facility
    - The contractor shall be obliged to obtain all necessary technical conditions.
      - Submit the scope/volume of works substantiated by the findings of the detailed study;
      - Make the design in **7 copies** on **A2** format paper;
      - Agree the design and cost estimates with the client after completing the works.

According to the RA MoUD order No11-N of 14.01.2008, and RA Government decree N526-N of 04.05.2017, the following documents must be attached to the design package:

- The implementation schedule (plan) by individual types of work;
- Requirements for the licensing, technical means and workmanship for the implementation of the construction project.

## II. Expected main outputs

The final output of the task shall be the designs made for seismic improvement, energy-efficiency improvement, and renovation of 20 kindergartens by Lots to be submitted in the electronic carrier (in AutoCAD compatible format) and in **7 copies** on **A2 format** paper. The cost estimates and the bill of quantities shall be submitted in electronic version (excel format) **4 copies** on **A4 format** paper.

**The entire package of design documents** shall be prepared in two languages: **Armenian and English.**

## III. Professional requirements

The bidding organization (company) shall have:

- at least **5-year** experience in designing public buildings;
- a staff of experienced specialists **for each Lot**, including:
  - one senior architect, with a minimum of 10 years working experience (whom can take the role of team leader);
  - one senior structural engineer, with a minimum of 10 years working experience (whom can take the role of team leader);
  - one architect, with a minimum of 5 years working experience;
  - one structural engineer, with a minimum of 5 years working experience;
  - one HVAC expert, with a minimum of 5 years working experience;
  - one water supply and sanitation expert, with a minimum of 5 years working experience;
  - one electrical engineer, with a minimum of 5 years working experience;
  - one estimator, with a minimum of 5 years working experience.

Organizations bidding for several lots are required to present the list of experts by Lots, as described in the table below.

LOT	Team Leader	Senior Architect	Senior Structural Engineer	Architect	Structural Engineer	HVAC Expert	Electrical Engineer	Water supply and sanitation Expert	Estimator
No	full name	full name	full name	full name	full name	full name	full name	full name	full name
1									
2									
...									



#### IV. Required composition of the design documents

Making of design documents for kindergartens shall be guided by “Rules for the composition and content of the design document for residential, public and industrial buildings” approved by the Order N273-N of the Minister of Urban Development made on November 29, 2006.

The design documents shall also include a part on energy performance of the building, i.e. the energy performance passport (the format shall be agreed with the client).

The bids made shall comply with the standards specified in the “Rules for cost estimation of urban development documents/projects and architectural and civil engineering/development works” approved by the Order No19-N of the Minister of Urban Development made on 15.02.2008.

The price proposal (bid) shall be made individually for each kindergarten and in total by Lots.

**The tender shall be held by individual Lots according to Annex 1. Each organization may bid for any number of Lots by submitting a common package of documents including separate sealed envelope(s) with price proposal(s) for each individual Lot. The sealed envelopes with price proposals shall indicate the Lot number.**

Price proposals for Lots can be made in the following tabular format:

Lot number	Kindergarten number	design price	author supervision price	total for kindergarten	Total for Lot
#	No A	a	d	a+d	(a+d)+(b+e)+(c+f)
	No B	b	e	b+e	
	No G	c	f	d+f	

***NOTE: The price for author supervision shall be equal to at least 20% of the total contract price.***

#### V. Timeline

For all the kindergartens included in each LOT, the design development package should be submitted in 5 months.

The contractor should submit the finalized draft design package per each kindergarten in each lot via e-mail no later than 100 calendar days after beginning of the work.

The client will provide feedback in 10 calendar days, after which the contractor is obliged to submit the finalized version of the package (in soft and hard copies) in 20 calendar days, taking into account all the comments and revisions made by the client.

		Month 1	Month 2	Month 3	Month 4	Month 5
Lot #N	Kindergarten #A					
	Kindergarten #B					
	Kindergarten #C					

	Deign Period
	Client’s revision
	Final correction, print out and submission

## VI. Payment procedure

The payment shall be made in **two phases** (design works and author supervision):

- Design works: the payment will be made in two installments based on the signed Acceptance Acts (for each Lot):
  - a) 40% of the payment can be made upon submission of:
    - 1) Building's existing dimensional drawings with all the specifications,
    - 2) Structural drawings with all the specifications,
    - 3) 80% of the architectural drawings with related specifications.These drawings should be submitted not later than 2.5 months from signing the contract.
  - b) 60% of the payment can be made upon submission of the requested package in full, within the deadline noted in the timeline, including addressing of the received comments.
- Author Supervision: after fully completing the construction works (and field supervision respectively) the payment shall be made for the author supervision based on the Acceptance Act (for each Lot).

The ownership rights of the designs shall belong to the client.

## ANNEX 1

		Under EE component	under general repairs/rehabilitation / construction
<b>A</b>	<b>Roof</b>		
1	Removal of roof cladding	X	
2	Refurbishment of the roof cladding	X	
3	Installation of new roof cladding	X	
4	Refurbishment/installation of the flat roof waterproofing membrane(s)	X	
5	Installation/improvement of metal railing	X	
6	Removal of construction waste (in attic floor)	X	
7	Improvement of existing pitched roof wooden/metal framework	X	
8	Concrete screed layer for leveling the attic floor/roof	X	
9	Improvement of the ventilation shafts on the roof/attic floor level	X	
10	Improvement of the flue gas shafts on the roof/attic floor level	X	
11	Thermal insulation of the attic floor (pitched roofs)	X	
12	Thermal insulation of the cold roof (flat roofs)	X	
13	Provide accessibility in attic floor level for future maintenance of the roof and/or telecommunication accessories setup	X	
14	Installing/improving the rainwater management & drainage system	X	
15	Installing/improving rain gutters	X	
16	Installing/improving downpipes	X	
<b>B</b>	<b>Exterior Walls</b>		
1	Demolition of loose-fill parts and all building elements, which jut out the façade and are not of any structural importance	X	
2	Levelling/filling the joints/cracks on the surface of exterior walls	X	
3	Insulation of exterior walls	X	
4	Decorative rendering/painting of the facades	X	
5	New concrete/asphalt sidewalk installation on the ground level		X
<b>C</b>	<b>Windows</b>		
1	Dismantling existing old/defective/poor windows on the exterior shell	X	

2	Installation of new windows on the exterior shell	X	
3	Installation of window sills - internal & external	X	
4	Repair works of the window reveals - internal & external	X	
5	Dismantling defective interior/partition windows	X	X
6	Installing new windows in the interior	X	X
<b>D Doors</b>			
1	Dismantling existing old/defective/poor doors on the exterior shell	X	
2	Installation of new doors on the exterior shell	X	
3	Repair works of the door reveals - internal & external	X	
4	Dismantling defective interior/partition doors		X
5	Installing new doors in the interior (partition doors)		X
<b>E Basement/Slab on grade</b>			
1	Refurbishment of basement ceiling	X	
2	Installation of insulation layer on the basement ceiling level	X	
3	Rendering/covering/coating of the insulation	X	
4	Refurbishment of the slab on grade level, levelling screed layer	X	
5	Insulation of the slab on grade	X	
6	Floor cover installation (concrete/tiles/laminate)	X	
<b>F Lighting</b>			
1	Installation of new efficient luminaries	X	
2	Assembly of new wiring if associated with new lamps and if modification of wiring layout is needed	X	
3	Assembly of new wiring (if not falling under the above category)		X
4	Installation of plugs and sockets		X
<b>G Ventilation</b>			
1	Installation of new ventilation shafts/ducts	X	
2	Installation of fans	X	
3	Installation of wiring and accessories	X	
4	Installation of new automatic air vents (or trickle vents, or air inlets) in window frames	X	
<b>H Heat Recovery</b>			
1	Installation of heat recovery units	X	
2	Wiring and accessories	X	

<b>I</b>	<b>Heat Pumps</b>		
1	Installation of air source heat pumps	X	
2	Installation of ground source heat pumps	X	
3	Soil excavation/cut, piping	X	
<b>J</b>	<b>Renewable Energy</b>		
1	Installation of solar thermal systems	X	
2	Installation of reservoir/boiler	X	
3	Installation of heat exchanger	X	
4	Piping	X	
5	Installation of Solar Photovoltaic system (modules, inverters, wiring)	X	
6	Framing installation	X	
7	Concrete works for ground mounted systems	X	
<b>K</b>	<b>Hot Water Supply</b>		
1	Installation of electric water heaters		X
2	Wiring and accessories		X
3	Piping and accessories		X
<b>L</b>	<b>Heating System</b>		
1	Replacement of existing boilers with condensing	X	
2	Automation in the boiler station	X	
3	New piping installation (where needed) comprising surplus thermal insulation of the external and basement pipes	X	
4	Replacement of part of the existing radiators (most obsolete), insuring adequate quantity of radiators sections (also considering the condensing regime for operation).	X	
5	Installation of multi-layer reflective thermal insulation behind the radiators	X	
6	Thermostatic valves on radiators (partly automatic and manual)	X	