Title of the measure:	**LV 32 Energy Performance of Buildings (Recast Directive 2010/31/EU) - minimum thermal insulation standards** *(Minimālo energoefektivitātes prasību paaugstināšana jaunbūvēm un rekonstruējamām ēkām: Ēku norobežojošo konstrukciju siltumtehnikas standards)*

General description

The particular measure is included in both Household and Tertiary sector of MURE database.

Latvia's 2nd NEEAP [1] had envisaged raising of minimal energy efficiency (EE) requirements for new buildings and buildings under reconstruction. Target audiences – owners of buildings and building companies. It had been stated by the 2nd NEEAP the re-cast of the minimum EE requirements for windows, buildings boundary constructions as well as for technical systems of the buildings. Responsible ministry for the implementation - Ministry of Economics, responsible authorities for the monitoring – Ministry of Economics and municipal Building Boards.

The Latvian Construction Standard LBN 002-01 "Thermotechnics of Building Envelopes" [2] came into force 1st January 2003; the latest Amendments, adopted in April 2014 [3], had introduced the requirements of the recast Directive 2010/31/EU on Energy Performance of Buildings. The new values are mandatory for the projects which have been developed starting from the 22th April 2014[1].

In 07 September 2013 it had been adopted the new version of the Construction Law [4]. After adoption of this new Law, the Cabinet of Ministers (Government) had substituted also the relevant Governmental Regulations. Thus, in 30 June 2015 the Government adopted the national Construction Standard LBN002-15 "Thermotechnics of Building Envelopes" [5], however these regulations, compared to the previous version, are not changed in point of fact[2].

The purpose of the given Construction Standard is to reduce final energy consumption in buildings by increasing their EE. The Standard determines the requirements for boundary thermotechnics for new buildings and buildings under renovation/reconstruction as well as for new heating premises to be installed in already built buildings, the temperature in which during the heating season is maintained at 8^0C and higher. Energy efficient construction elements promoting EE and limiting CO_2 emissions shall be provided for in the building design and construction.

The Standard sets two types of values for heat penetrability coefficients for different building's construction elements (see Table 1). At first, the normative values are used in the building design when calculation of the heat loss coefficient for the building is performed. The calculated heat penetrability coefficients of built building may be higher than defined normative values however shall not exceed the defined maximum values.

[1] the construction projects which had been accepted or submitted in Building Boards up to 22th April 2014 and the construction projects which are made according the planning and architecture tasks issued up to 22th April 2014 should not be re-designed according 2014 Standard requirements.

[2] Only the new Section 3.2 is introduced by these 30th June 2015 Regulations, see the following Table 1.

Table 1. *Normative and Maximum Values of Heat Transmittance Coefficients for the Construction Elements U_{RN}W/(m^2 x K) and for the Linear Thermal Bridge Ψ_{RN}, W/(m x K), in force from 22.04.2014 [5].*

No.	Construction elements	Residential houses, homes for the elderly, hospitals and kindergartens	Public buildings, except homes for the elderly, hospitals and kindergartens	Industrial buildings
1.	Roofs and coverings which are in contact with outdoor air	normative 0.15 * k maximum 0.20 * k	normative 0.20 *k maximum 0.25 * k	normative 0.25* k maximum 0.35*k
2.	Floors on the ground	normative 0.15* k maximum 0.20 * k	normative 0.20* k maximum 0.25 * k	normative 0.30* k maximum 0.40 * k
3.1	Walls	normative 0.18 * k maximum 0.23 * k	normative 0.20 * k maximum 0.25 * k	normative 0.25 * k maximum 0.30 * k
3.2	Walls of traditional log buildings without heat insulation layer in the wall (only maximum normatives)[see note]	maximum 0.65*k	maximum 0.65*k	maximum 0.30*k
4.1	Windows, balcony doors, other glazed constructions	normative 1.30 * k maximum 1.80 * k	normative 1.40 * k maximum 1.80 * k	normative 1.60 * k maximum 1.80 * k
4.2	Outer doors	normative 1.80 *k maximum 2.30 * k	normative 2.00 *k maximum 2.50 * k	normative 2.20 * k maximum 2.70 * k
5.	Thermal bridges R, Ψ_{RN}	normative 0,10 * k maximum 0.15 * k	normative 0.15 *k maximum 0.20 * k	normative 0.30 *k maximum 0.35 * k

Note:
k – the temperature factor, the coefficient is calculated according the formulae k =19/(T_i – T_{oe}), where
T_i - the in-door temperature (°C), depending on use of building, T_{oe} - the average out-door temperature (°C) during the heating season in conformity with the Latvian Construction Standard 003-15 „Construction Climatography", or the temperature in the next room, if the calculation of a construction element between two adjacent premises is performed.
The values of k are presented in the Annex's Table 8 of the noted Regulations [5]. As example, in case of 19°C in-door temperature, the values of *k* varies in the range 0.90 (average out-door temperature minus 2.0°C) up to 1.06 (average out-door temperature plus 1.0°C)
Note:
The section 3.2 is introduced by the 30 June 2015 Regulations [5].

Impact evaluation (methods and results)

The method of impact evaluation by Latvia's 2nd EEAP – "top-down" [1]. It is planned by Latvia's 2nd NEEAP [1] to have specific energy saving of 20kWh/1m2 for new and reconstructed buildings. The total volume of annually build/reconstructed area was anticipated 1.5 million m2 (both residential and commercial sectors). Based on these data the annual energy savings of 30 GWh (0.108 PJ) were calculated (both residential buildings and tertiary sector buildings) by 2nd NEEAP [1]:

- planned energy savings, year 2016 - 150 GWh (0.54 PJ);
- impact on energy savings, year 2020 - 270 GWh (0.972 PJ)

However, the 2nd NEEAP had planned the new regulations starting from 01.06.2012. In reality there is 2 years delay, namely, new regulations had been adopted only April 2014. Taking into account this delay, the given above figures (both residential and tertiary sector) might be recalculated as follows:

- planned energy savings, year 2016 - 90 GWh (0.324 PJ);
- impact on energy savings, year 2020 - 210 GWh (0.756 PJ).

In practice, the impact depends on the complex package of interacting measures, including both Construction standard, Energy certification of residential buildings, Financial instruments/measures for energy efficient renovation of residential buildings. The sector of residential buildings in Latvia has huge potential for energy savings, and the issue is to define adequate instruments mobilising this potential. Area of residential buildings constitutes ~ 87 Mm2. In turn, the stock of multi-dwelling residential buildings in Latvia consists of 38.6 thousand buildings with a total area of 50.4 Mm2, of which a majority were built by 1993, before the significantly higher requirements for thermal engineering of building envelopes were set and thus the buildings have a low energy efficiency level. Only 6% of multi-dwelling residential buildings area has been built 1993-2002 and 5% - after 2003 [6, *Table 1 and Figure 1b*].

However, the activity of construction sector in Latvia is lower compared to those anticipated by the 2nd NEEAP. Using the *ex-post* data of construction activity in 2014- 2016 [7], it was commissioned new residential area of 1.3 Mm2. Attributing the energy efficiency improvement of 20 kWh per 1 m2 as the direct impact of the new Standard, it might be calculated the energy savings of 26 GWh (~0.094 PJ) in residential sector in year 2016. The impact of the Standard might be higher due to the renovated area is not included in the presented calculation.

Anticipated savings at the end of EU Funds 2014-2020 programming period (2023)

- assuming the rate of new buildings area, as it was in 2014-2016, also for the next 2017-2022 period, it might be anticipated 26+52 GWh =78 GWh (0.28 PJ) savings in 2023 due to new building
- within the EU funds programme it might be expected renovation up to ~ 2 mill m2 of residential building area[3] (calculation based on the data, provided by [8], *see the measure HOU-LV42*). If 20 kWh/1 m2 energy savings is attributed as the direct impact of the Construction Standard, it may be calculated energy savings up to 40 GWh (0.144 PJ) in year 2023.
- Thus, total savings in 2023 might be anticipated 118 GWh (~ 0.425 PJ).

The envisaged savings in residential sector may be higher due to additional savings might be reached by investing private investments outside the framework of noted EU Funds programme as well. However the development of such private business area is hard to predict.

For comparison, the total final energy consumption in Latvia residential sector constituted ~ 57 PJ [9, average for years 2009-2014]. Thus the impact of the improvement of values of Construction Standard might be attributed as high.

Interaction of measures

In 2013 it had been introduced by the new Governmental Regulations [10] six (A-F) energy efficiency classes of residential buildings (see the Table 1 in the MURE Household sector measure *HOU-LV30 "Energy Audits and Energy Certification of Residential Buildings*"). The "F" class (more than 150 kWh/1m2 annually for heating[4]) is stated as EE requirements' non-corresponding class in which EE improvement measures shall be implemented.

The financial support for energy efficient renovation of residential buildings is planned in the 2014-2020 EU Structural Funds programming period, see the MURE database Residential sector measure *HOU-LV42*.

The EE investments in residential buildings in 2014-2020 financial programming period are supplemented with the investments to improve efficiency of district heating systems, foreseen by the [11, sections 334-345].

[3] See the description of the Latvia measure HOU-LV42 „*Increasing Eenergy Efficiency in Apartment Buildings: 2014-2020"* in the MURE database Household sector

[4] for the buildings which have rooms of 3.5 meters high, the value is recalculated.

Historical data

Table 2 presents development of the normative requirements for thermotechnics of building envelopes for the year 1979-2013.

Table 2. Normative Values of Heat Transmittance Coefficients for the Construction Elements of Residential Houses Related to Specific Energy Consumption (according the Table 11 of [6]).

Construction Elements		**1980**	**1992**	**2003-2013**
Roofs and coverings which are in contact with outdoor air	*W/ (m²·K)*	0.90	0.25 – 0.40	0.2 k
Floors on the ground		-	0.5	0.25 k
Walls at weights less than 100 kg/m²		1.1	0.33 – 0.50	0.25 k
Walls at weights 100 kg/m² and over				0.3 k
Windows, doors		2.4	1.9 – 2.4	1.8 k
Thermal bridges		-	-	0.2 k
Specific annual energy consumption for heating	kWh/m² annually	150 – 200	100 – 130	70 – 90

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