I. Introduction

The result of the development of smart technologies is the application of innovations by the ordinary user in situations for which specific skills, specialized institutions and trained personnel required earlier [1]. The willing of a person to independently control the health status led to the appearance and widespread of the platforms for invasive and non-invasive health monitoring available for anybody [2]–[5]. Among others, one of the most common types of noninvasive devices is portable devices and platforms that measure heart muscle activity [6]. The standard first lead of the electrocardiogram (ECG) is usually used for that, which is mostly obtained by registering the signal on the left and right hands. Wherein, it is possible to get vital signs by analyzing both the morphology of the signal [7]–[8] and heart rate variability (HRV) [9]–[11]. HRV indicators reflect the vital indicators of controlling the physiological functions of the body - the vegetative balance and the functional reserves of its control mechanisms. By analyzing HRV, we cannot only assess the functional state of the body, but also monitor its dynamics, up to pathological conditions with a sharp decrease in HRV and a high probability of sudden death. It is shown that a decrease in HRV indicates a violation of the autonomic control of cardiac activity and is unfavorable for the prognosis. The highest HRV values are recorded in healthy young people, athletes, intermediate in patients with various organic heart diseases, including ventricular rhythm disturbances, the lowest - in people who have experienced episodes of ventricular fibrillation. The state of the autonomous nervous system and regulatory mechanisms is assessed using a number of statistical and spectral indicators recommended as international standards by the Working Group of the European Cardiology Society and the North American Society of Cardiac Stimulation and Electrophysiology. So it's clear that quality of ECG signal should be high. But due to the peculiarities of getting an electrical signal from the surface of the skin, ECG is often distorted by interference. It includes power net noise, electromagnetic noise of various equipment, baseline wander, electrode motion, muscle artefact, and others [12]–[13]. A particular challenge is the high-intensity noise created by muscle tremors. Many analogue and digital filters have been proposed to manage various kinds of noise. Most filters fulfil the task only partially. Some types of noise and artefacts are random in nature and lie in a wide frequency range [14]–[15]. Therefore, filters are not able to clear the signal from interference that is within the range of the heart signal. Muscular artefacts belong to in-band signals, i.e. they are in the frequency band of the heart electrical activity. A common situation is the effect of high-intensity muscular noise on a useful signal. Hence, for wearable devices, the challenge is to obtain a reconstructed ECG suitable for visual, automatic and other types of analysis. For these purposes, post-filtering signal smoothing may be suitable, which is applied (or not applied) depending on some quickly-calculated real-time metric. The ECG compression coefficient can be used as such a metric [16]. The objective of this work is to determine the criteria for the necessity of using post-filtering smoothing based on ECG lossless compression for signals distorted by high-intensity noise.