Let $\mathcal{H}$ be a separable complex Hilbert Space, $\mathcal{L}(\mathcal{H})$ be a space of bounded linear operators over the $\mathcal{H}$. Let $A \in \mathcal{L}(\mathcal{H})$, and $B$ be a self-adjoint (in general – unbounded) operator in $\mathcal{H}$. We say that $A$ is translation-invariant relatively the $B$ if $A$ commutes with $B$. The main examples of translation-invariant operators are as follows

$$(A_K x)(\vec{t}) = \int_{\mathbb{R}^d} K(\vec{t}, \vec{s})x(\vec{s})d\vec{s}, \quad \vec{t} \in \mathbb{R}^d, \ x \in \mathcal{H}$$

in the space $\mathcal{H} = L_2(\mathbb{R}^d)$, $d \in \mathbb{N}$, with the kernel $K$, satisfying

$$K(\vec{t} + h, \vec{s} + h) = K(\vec{t}, \vec{s}), \quad \vec{t}, \vec{s} \in \mathbb{R}^d, \ h \in \mathbb{R},$$

where $\vec{t} + h \equiv (t_1 + h, \ldots, t_d + h), \ \vec{t} = (t_1, \ldots, t_d) \in \mathbb{R}^d$. These operators are translation-invariant with respect to the generator of the group $U(\tau)x(\vec{s}) = x(\vec{s} + \tau), \ \vec{s} \in \mathbb{R}^d, \ \tau \in \mathbb{R}$, and, in general, they haven't bounded trace [1]. This is a reason that in [1] for Hamilton operators of superconductors it was introduced the concept of the difference variable trace of these operators.

In the present talk the notion of the generalized projection trace is introduced. We prove that the space of operators $A \in \mathcal{L}(\mathcal{H})$ with bounded generalized projection trace is not complete. To define the Banach space we construct the expansion $\mathcal{L}^{++}(\mathcal{H})$ of the space $\mathcal{L}(\mathcal{H})$, and consider the subspace of operators $A \in \mathcal{L}^{++}(\mathcal{H})$ with with bounded generalized projection trace. Note that in the general case $\mathcal{L}^{++}(\mathcal{H})$ can not be interpreted as space of operators (even unbounded) over the space $\mathcal{H}$.