

# Vernacular Iranian Ice- Houses Application and Technology with Regard to Sustainable Solutions and Vitruvian Principal of Architecture

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## Abstract

Despite the fact that Sustainability in architectural design is a recent global term, indigenous Iranian architects had applied most of its criteria in their building construction, such as Ice- House or from the Iranian native language "Yakhchal", utilizing as a system to produce and preserve Ice, a fundamental way of refrigeration process, having no adverse impact on the natural environment, in addition; the shape of Ice- house Structure is inspired of the bubble in nature. In this research we firstly assessed Ice-house types, its application, work procedure, then the sustainability evaluation with regard to Ice-house structure has mentioned, as one of the significant conclusion, the ice-house, introducing in this research as a gigantic marvelous system, regarding to Vitruvian concepts of architecture, that firmness provided in this huge scaled structure via the shape and the blind arcade of the shading wall, also the dome roof shape in numerous ice-houses in arid regions of Iran, which obviously bear the comprehensive loads by the appropriate material strength, the commodity also implemented by the mediating temperature via dome roof shaped and ultimately the delight providing, in this functional structure had been evaluated, from the other side, as the result of more complex artificial refrigeration methods ,today's the current application of Ice- house as a potential of revitalization for convention centers or utilizing its conceptual shape in architectural design has been vividly taken to be account.

**Key words:** Ice-House structure, Ice-House application, Energy management, Thermal mass, vernacular sustainability, Vitruvian concepts

## Introduction

In ancient time providing cold drinking water in hot and dry regions of Iran was the first reason of constructing Ice- house structure. A large part of Iran is arid ,so that initiative of indigenous architects in cities such as Esfahan, Kashan, Zavare, Sabzevar , Kerman, Meimand, Yazd and Bam based on providing Ice in winter days and reserved till the summer came to utilize for cooling drinking water and foods in severe hot days. In the current research we first considered the history of Ice-house via ancient tourist description, then the structure and types of Ice-house noticed respectively, regarding to Vitruvian concepts of architecture, further more we specifically focused on thermal process In Ice- house