E.O. Paton Electric Welding Institute of the National Academy of Sciences of Ukraine

International Scientific-Technical and Production Journal

The Paton WELDING JOURNAL

Issue 09 2018

Published Monthly Since 2000

English translation of the monthly «Avtomaticheskaya Svarka» (Automatic Welding) journal published in Russian since 1948

Founders
E.O. Paton Electric Welding Institute, NASU
International Association «Welding»

Publisher
International Association «Welding»

Translators
A.A. Fomin, O.S. Kurochko, I.N. Kutianova
Editor
N.G. Khomenko
Electron galley
D.I. Sereda, T.Yu. Snegiryova

Address
E.O. Paton Electric Welding Institute,
International Association «Welding»
11 Kazimir Malevich Str. (former Bozhenko Str.),
03150, Kyiv, Ukraine
Tel.: (38044) 200 60 16, 200 82 77
Fax: (38044) 200 82 77, 200 81 45
E-mail: journal@paton.kiev.ua
www.patonpublishinghouse.com

State Registration Certificate
KV 4790 of 09.01.2001
ISSN 0957-798X
DOI: http://dx.doi.org/10.15407/tpwj

Subscriptions
$384, 12 issues per year,
air postage and packaging included.
Back issues available.

CONTENTS

VISIT TO WELDING CENTER OF ISF-2 PROJECT IN CHERNOBYL

Today interest to nuclear safety is relevant like never before. For Ukraine it is, first of all, connected with large-scale accident at Chernobyl NPP in 1986. By the initiative of the journal editorial board in July, 2018 there was organized a visit to ISF-2 facility of specialists of the E.O. Paton Electric Welding Institute in the lead of deputy director Prof. L.M. Lobanov.

Currently, works on project ISF-2 are carried out in Ukraine in order to solve the problem of safe storage of spent nuclear fuel as well as materials from ruined by accident 4th power generating unit of ChNPP. The project is held under the supervision of the International Atomic Energy Agency and agreements of SSE Chernobyl NPP with Holtec International Company, USA.

A course of work performance in Ukraine on ISF-2 project is carried out under the supervision of government, State Nuclear Regulatory Inspectorate of Ukraine and according to the project of Holtec International Company. Participation of the E.O. Paton Electric Welding Institute in the separate stages of ISF-2 construction at Chernobyl NPP is determined by the project.

It is supposed that at the end of 2018 there will be carried out the «hot» tests at new ISF-2 facility, which includes an object on preparation of spent nuclear fuel and storage itself (Figure 2). Start of work in full capacity is planned for fourth quarter of 2019. Launching the new storage is rated as substantial forward step of Ukraine in development of facility, operation of which will allow changing the existing scheme of handling the spent nuclear fuel of domestic nuclear power plants, thus, strengthening energy security. It is planned that the facility will provide safe storage of the spent nuclear fuel from Rivne, Khmelnytskyi and South-Ukraine NPP for 100 years. Operation of the facility will be carried out using advanced technology of «dry» storage with two-barrier sealing system, which is provided with the help of special engineering systems of canister type from Holtec International Company. The latter are double-wall dry canisters (DWC) of around 4 m length and 2 m diameter.

Today DWCs of American production are delivered to ISF-2. It should be noted that SSE ChNPP is ready to consider the proposals of the Ukrainian enterprises on organization of production of such canisters using domestic materials.

Loading of spent nuclear fuel in DWC, welding of two main lids and welding-up of three auxiliary ports in the lids (Figures 3, 4) will be provided during ISF-2 operation. Automatic nonconsumable electrode welding with feeding of «hot» filler metal (welding

Figure 1. Object for SNF preparation

Figure 2. Storage of SNF

of the lids) and manual TIG (auxiliary ports) will be used for welding operations by Holtec International technology.

A welder-operator will carry out a remote control of the process of automatic multipass welding of the lids in the specially equipped site having the possibility of visual monitoring of the process and regulation of weld metal formation. For performance of this process Holtec has selected the arc equipment (power source and welding automatic machine with wire heating) of well-known company Liburdi (Figure 5).

E.O. Paton Electric Welding Institute carries out separate operations of technological processes of welding (under conditions of ChNPP exclusion zone) of seal welds on DWC loaded with spent nuclear fuel under the contract with Holtec International Company. They include:

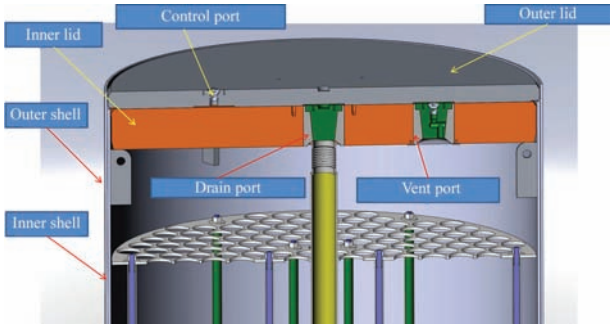

Figure 3. Scheme of performance of permanent joints

• elaboration of version of Holtec technological instructions for welding of seal welds;

• preparation of welding process flow-charts of each weld, their qualification and agreement with SNRIU applicable to working conditions in SSE ChNPP exclusion zone;

Figure 4. Welding-up of canister lid

• qualification of welding technological process at SSE ChNPP production facility for performance of welding of seal welds on DWC loaded with spent nuclear fuel;

Figure 5. Liburdi welding system

• training and qualification of welder-performers of DWC seal welds under conditions of ChNPP exclusion zone;

• participation in control field test of welding technological process of seal welds on DWC loaded with spent nuclear fuel;

• compiling the analytical scientific-technical reference-substantiation for granting SSE ChNPP with a license from SNRIU for performance of works on DWC sealing.

Currently, old storage contains 21297 spent fuel elements, which will be transferred to ISF-2. Every year it is planned to move 2500 fuel assemblies, i.e. in a 10-years period all the nuclear wastes will be located in ISF-2, period of storage of which is around 100 years.