# BINP-FAIR-TUV Collaboration

Katja Petrowa
On behalf of Budker Team

6th BINP-FAIR Collaboration Coordination Workshop
26 April 2021 to 1 May 2021
Online

# Content

- TUV Rheinland FAT acceptance for FAIR
- TUV Rheinland Welding Procedure Qualification and Certification of welders at BINP


# TUV Rheinland FAT acceptance for FAIR, 13-15 April 2021

**Main goals**

- For BINP and FAIR it is required to carry out FAT acceptance for equipment produced under BINP-FAIR contracts in a COVID-19 pandemic situation;
- FAIR insists on an independent FAT acceptance;
- FAIR trusts the results of the inspection, no re-inspection is required on FAIR site;

**First experience**

- FAT Acceptance for HEBT Quadrupole Magnets Q2 and HEBT Vacuum Chambers for Dipole magnets D13;
- The independent FAT acceptance with the participation of a third party represented by TUV Rheinland is doable;

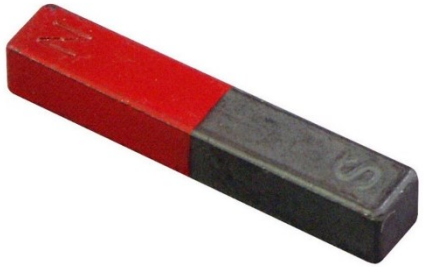
**Basic approach**

- Acceptance of hydraulic, electrical, magnetic tests is carried out by FAIR on the basis of the results presented in the General Certificates;
- FAT acceptance by a third party is a *visual inspection* of the equipment in accordance with the inspection plan ("Handouts for FAT acceptance", FAIR) using the following tools (feeler gauge, pocket lamp, weld seam gauge, sphere, check gauge, permanent magnet, measuring tape, inspection mirror, multimeter, etc. ).

*Visual inspection* using the following tools*:* feeler gauge, pocket lamp, weld seam gauge, sphere, permanent magnet, measuring tape, inspection mirror, multimeter, etc



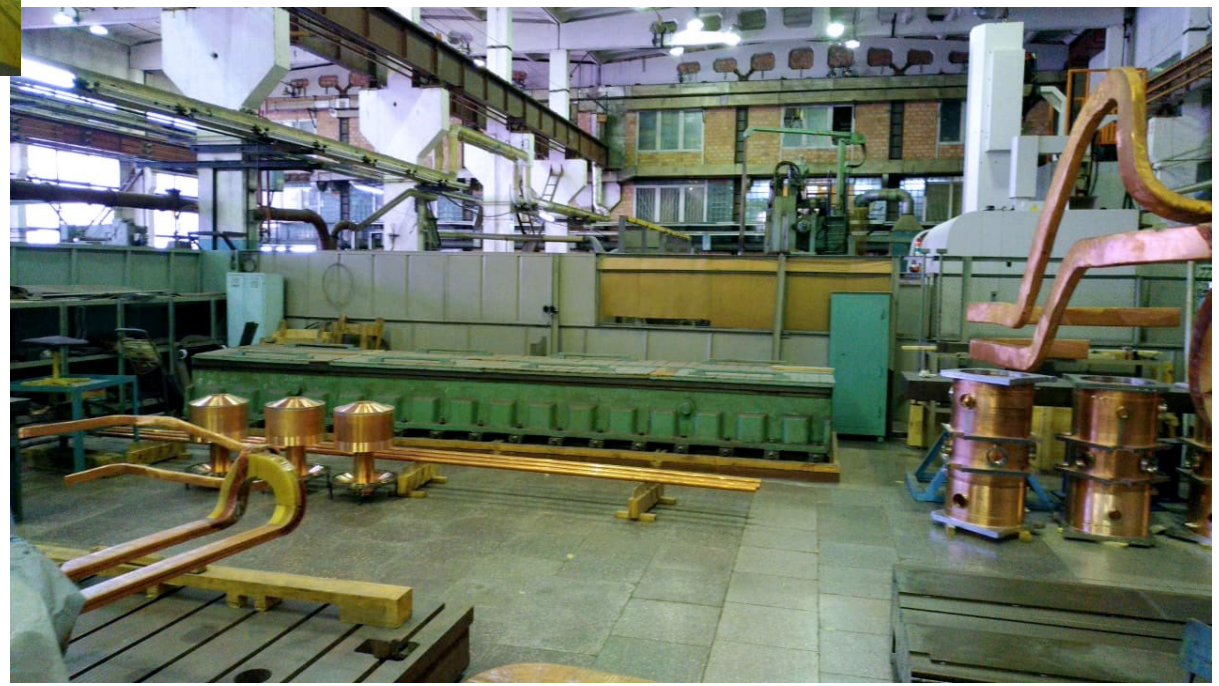




# Test areas at Budker Workshop

For magnets

For vacuum chambers



- TUV Rheinland sent a welder specialist as an inspector. TUV Rheinland specialist performed a visual inspection using the above-mentioned instrumentation in accordance with the inspection plan from FAIR. TUV Rheinland specialist did not perform hydraulic, electrical, magnetic tests.

# Scope of the work over the next months of the year 2021

- Scope of the work for FAT acceptance: HEBT contract;
- No need TUV participation: Dipole magnets & CR Rest contracts (FAIR Contract No. CC CR.HOAI, Technical Coordination of the Construction of the Collector Ring to the Construction of the FAIR Facility );
- FAT acceptance process will be scheduled according to the manufacture of the equipment and preparation of the required documentation (once every 4-5 weeks);
- FAT acceptance can be performed by a third party represented by TUV Rheinland in the COVID-19 pandemic situation. No third party is required in absence of pandemic restrictions.

# Organization before TUV visit (documentation, checklists, instructions, work plan)

- Decision regarding participation of third party represented by TUV Rheinland in FAT acceptance must be officially recorded in contract documentation;
- General Certificates, User Manuals must be sent by the responsible BINP WPL to the responsible  FAIR WPL three (3) weeks before acceptance;
- FAT Checklist must be partially filled in by FAIR (check of hydraulic, electrical, magnetic tests according to the submitted documentation);
- Training of TUV Rheinland inspector must be provided by FAIR;
- BINP must develop a work plan for FAT activities in accordance with the visit information obtained in advance (visit dates, number of inspectors, agreed number of equipment for FAT acceptance).

# Organization during TUV visit (work schedule, tools, workplace)

- Team's work schedule must be sent to the responsible persons at BINP, FAIR and TUV (?) daily;
- TUV Rheinland inspector must be provided with the required tools be Budker Bureau of testing and control;
- Workplace and office (Magnetic Measurements Stand) are available at Budker Workshop;

# Options

- TUV Rheinland has four (4) welders to carry out FAT inspections;
- TUV Rheinland has a possibility to send a team of specialists - a welder and an electrician;

# TUV Rheinland Welding Procedure Qualification and Certification of welders at BINP, planned on May 2021

- Certification of welding process;
- Certification of welders;

# Welders Certificate

TÜVRheinland® Precisely Right.

| | | |
|---|---|---|
| 2 | Designation: | **EN ISO 9606-1 141 T BW FM5 S s5.0 D98 H-L045 ss gb** |
| 3 | | |
| 4 | WPS - Reference: | 1 Reference No: |
| 5 | Document No. (if applicable): | |
| 6 | Welder's Name: | Nikulin, Ilya Andreevich (1) |
| 7 | Identification: | |
| 8 | Method of Identification: | |
| 9 | Date and place of birth: | 9/4/1984 in Novosibirsk |
| 10 | Employer: | Budker's Institution of Nuclear Physics |
| 11 | Code / Testing Standard: | Directive 2014/68/EU, DIN EN ISO 9606-1:2017 |
| | Comments: | |
| | Supplementary fillet weld test: | no Examiner: Vladislav Maslov |
| 12 | Job knowledge: | fulfilled |

| | | Test piece | Range of qualification |
|---|---|---|---|
| 14 | Welding process(es): | 141 | 141, 142, 143, 145 |
| 15 | Product type (plate or pipe): | T | P, T |
| 16 | Type of weld: | BW | BW |
| 17 | Material group(s): | 8 (X2CrNiMo17-12-2) | |
| | Filler material group(s) | FM5 | FM5 |
| 18 | Filler material (Designation): | W 19 12 3 L Si | S, M; nm |
| 19 | Shielding gas: | EN ISO 14175 - I1 | Similar shielding gas |
| 20 | Auxiliaries / Flux: | EN ISO 14175 - I1 | |
| | Type of current and polarity | =- | --- |
| 21 | Material thickness (mm): | 5.00 | |
| | Deposited thickness | 5.00 | 3.00 - 10.00 |
| 22 | Outside pipe diameter. (mm): | 98.00 | ≥ 49.00 |
| 23 | Welding position(s): | H-L045 | H-L045, PA, PC, PE, PF |
| 24 | Weld details: | ss gb | ss mb, bs, ss gb |

25 Additional information is available on attached sheet and / or WPS

| | Type of test | Performed and accepted |
|---|---|---|
| 30 | Visual testing | X |
| 31 | Radiographic testing | X |
| 32 | PT testing | X |
| | | |
| | | |
| | | |

Certificate Authority: **TÜV Rheinland Industrie Service GmbH Notified Body for Pressure Equipment 0035**

Certificate No.: 01 202 BG/S-19 607

Certifier: Nikolay Stankov

Place / Date: Sofia, 7/9/2019

Unterschrift:

Date of welding: 11/6/2018

Validity of 11/5/2021

37 *) Append separate sheet, if required

38 According 9.3a: Confirmation of the validity by welding coordinator / examine / examining body for the following 6 month (refer to 9.2)

| 39 | Date | Signature | Position or Title | Date | Signature | Position or Title |
|---|---|---|---|---|---|---|
| | | | | | | |

Edition of standard: EN ISO 9606-1:2017

created with EuroWeld Version 5.44.00.204



**Industrial Services**

**Нотифицированный орган по оборудованию под давлением**

Certification Body for Pressure Equipment

TÜVRheinland® Precisely Right.

## Квалификация сварочной процедуры – Металл / Welding Procedure Qualification - Metal (WPQR)

**WPQR №.**.: 01 202 RU/V-18 0057

| | |
|---|---|
| Производитель: Budker's Institution of Nuclear Physics, Russia<br>Manufacturer: | Сварочная процедура производителя:<br>Manufacturers Welding Procedure:<br>pWPS-Nr.: No 2 |
| Дата сваривания / Date of Welding: 06.11.2018 | Образец №. / Specimen No: 2-4-1, 2-4-2 |
| **СПЕЦИФИКАЦИИ** / SPECIFICATIONS: EN ISO 15614-1:2017 level 2, PED 2014/68/EU | |
| **ОБРАЗЕЦ ДЛЯ ИСПЫТАНИЯ** / TEST PIECE | |
| Материал – Обозначение (подгруппа согласно ISO/TR 15608)/<br>Material – Designation (Subgroup acc. ISO/TR 15608):<br>Внешний диаметр трубы, толщина/ Pipe Outer Diameter, Thickness [mm]: | 316 L(N) – IG (ITER_D_2A9VB8)<br>ISO/TR 15608: group 8.1<br>ø 92.0 x 2.0 mm |
| **ДИАПАЗОН СОГЛАСОВАНИЯ** / RANGE OF APPROVAL | |
| Подгруппа основного металла / Base Metal Subgroup: | 8b) – 8 |
| Толщина стенки / Wall Thickness [mm]: | BW: 1.0 – 4.0,<br>FW: 1.4 – 4.0 |
| Внешний диаметр трубы / Pipe Outer Diameter [mm]: | ≥ 46.0 |
| Тип сварки, Вид соединения / Weld Type, Joint Type: | BW (См. Прил. 1, стр. 2), FW |
| Сварочный процесс (ISO 4063) / Welding Process (ISO 4063): | 141 manual |
| Присадочный металл., Спецификация / Обозначение<br>Filler metal, Specification/Designation: | OK Tigrod 316LSi<br>ISO 14343-A: W 19 12 3 L Si |
| Толщина наплавленного металла / Deposited weld metal thickness [mm]: | BW: max 4.0<br>FW: 1.5 – 3.0 |
| однослойно (sl), многослойно (ml), / single-run (sl), multi-run (ml) | sl |
| Газ /Gas:<br>Флюс/Flux: — Спецификация – Обозначение /<br>Specification - Designation: | ISO 14175: I1 |
| Тип сварочного тока /Type of Welding Current: | DC- |
| Подвод тепла (min. – max.)/ heat input (min. – max.) [kJ/mm] | 0.240 - 0.339 |
| Мин. темп. подогрева / Min Preheat Temperature [°C]: | -- |
| Макс. темп.между проходами / Max. Interpass Temperature [°C]: | -- |
| Положение при сваривании согл. ISO 6947/ Welding Position acc. ISO 6947: | Все кроме PG, J-L045 / All except PG, J-L045 |
| Выдержка / Soaking: | -- |
| Послесварочная термообработка / Post Weld Heat Treatment: | -- |

ПРИМЕЧАНИЯ / REMARKS:
b) Диапазон сталей в той же подгруппе либо любой нижней подгруппе той же группы.
Covers steels in the same sub-group and any lower sub-group within the same group

**РЕЗУЛЬТАТ** / RESULT:
Настоящим подтверждается, что испытательные швы были подготовлены,сварены, испытаны в соответствии с вышеуказанными спецификациями и дали удовлетворительный результат
This is to certify that test welds were prepared, welded and tested satisfactory in accordance with the specifications indicated above.

**Место:** София **Дата:** 05.07.2019 Certification body for pressure equipment
Location: Date:

Приложения: 1. Протокол сварочного испытания / Report of Weld Test
Attachments: 2. Результаты испытания / Test Results

Dipl.Eng. N. Stankov
Сертификационный Орган № 0035
Notified Body ID Number 0035

**TÜV Industrie Service GmbH,** Am Grauen Stein, 51105 Köln,
**TUEV Rheinland Bulgaria EOOD,** 23A Dragan Tsankov Blvd,
1113 Sofia, Tel. +359-2-987-9291, Fax +359-2-987-6605