



EUROPEAN UNION



GOVERNMENT OF ROMANIA



SERBIAN GOVERNMENT



Structural Funds
2007-2013



ECOSOLDER

Romania - Republic of Serbia IPA Cross-border Cooperation Programme

**Promoting new ecologic filler alloys
for soldering, based on the non-ferrous ore of
the Romanian-Serbian cross-border area**

ECOSOLDER



Romania-Serbia

Common borders. Common solutions.



EUROPEAN UNION



GOVERNMENT OF ROMANIA



SERBIAN GOVERNMENT



Structural Funds
2007-2013



ECOSOLDER

Romania - Republic of Serbia IPA Cross-border Cooperation Programme

Quality assurance in welding and non-destructive testing of a Francis Turbine spiral casing Stay Vane Ring in ATB FOD

Authors: Dejan Ilić, dipl.ing.IWE

Jovica Krstić, dipl.ing.



ADDRESS AND LOCATION

ATB FOD Bor
Djordje Vajfert 16
19210 Bor
Serbia

Phone: +381 30 423 147

+381 30 424 677

Fax: +381 30 427 649

e-mail: fod@rs.atb-motors.com

web: www.fod.co.rs



ATB FOD
Technology in Motion

ABOUT COMPANY

The beginning of ATB FOD can be found in concept of centralized maintaining of Bor mine that was ones put together in central workshops. From this workshop electro-mechanical section was born and then factory of Equipment and Spare Parts Ltd.

Intensive development and building of new facilities had entailed Central workshops to be merged and to constitute Equipment and parts factory.

ABOUT COMPANY

Early 2005. ATB FOD starting to manufacture equipment for hydropower plants and hydro turbines in technical cooperation with leading European companies. Such plant and machinery are now installed in hydropower plants all over the world or used as spare parts for complete overhauls.

In May 2008. with privatization, ATB FOD becomes member of ATB Group who is one of the best known industrial holdings seated in Austria.

In March 2012. ATB Group becomes a part of chinese company Wolong.



PRODUCTION RANGE

SERVICES

MANUFACTURE OF EQUIPMENT AND SPARE PARTS

PRODUCTION RANGE



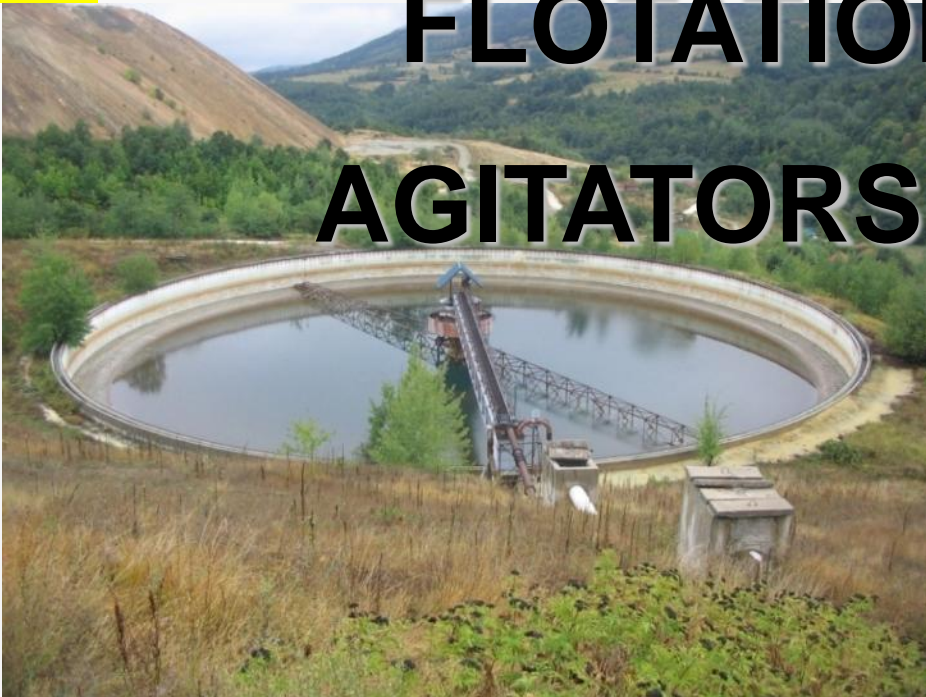
CONVEYORS SLURRY PUMPS HYDROCYCLONES VIBRATING SCREENS AND FEEDERS



PRODUCTION RANGE

**MINERAL DRESSING
EQUIPMENT
FLOTATION MACHINES**

AGITATORS, THICKENERS



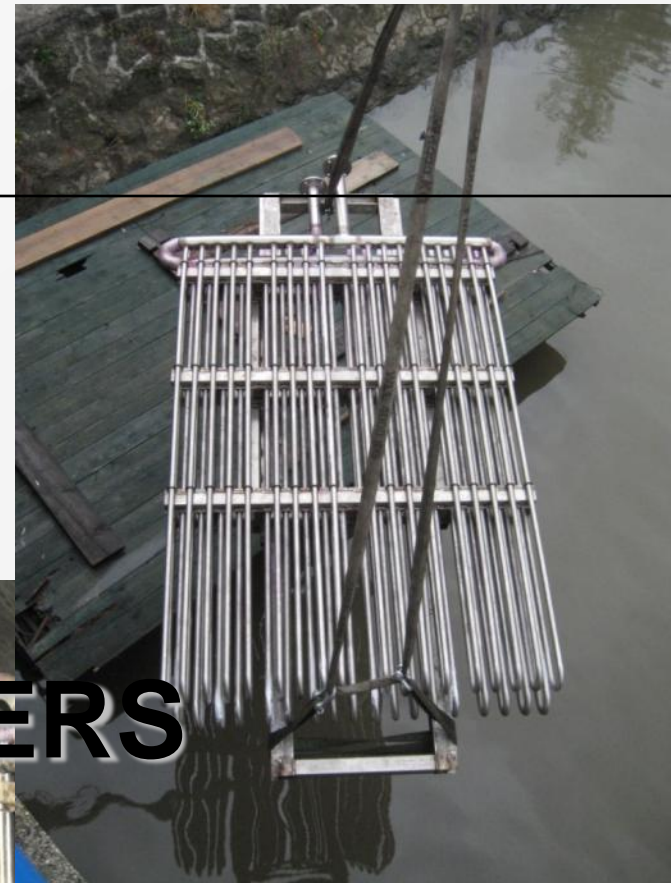
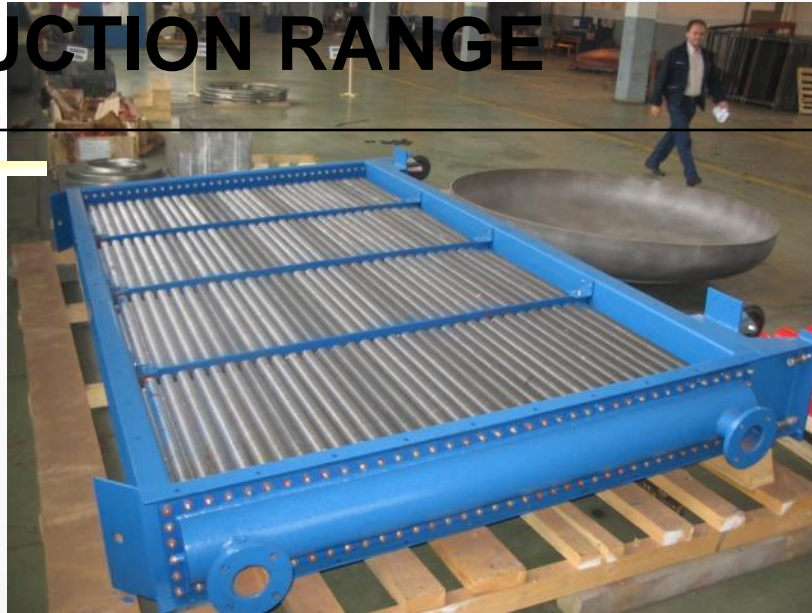
PRODUCTION RANGE



HEAT EXCHANGERS



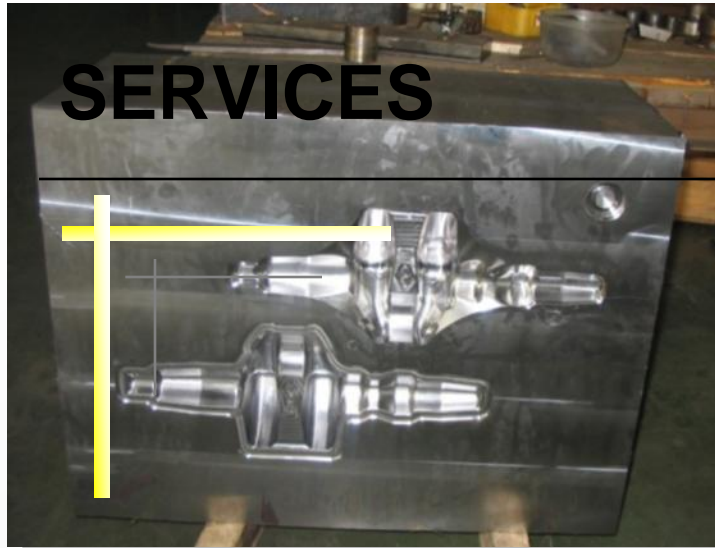
PRODUCTION RANGE



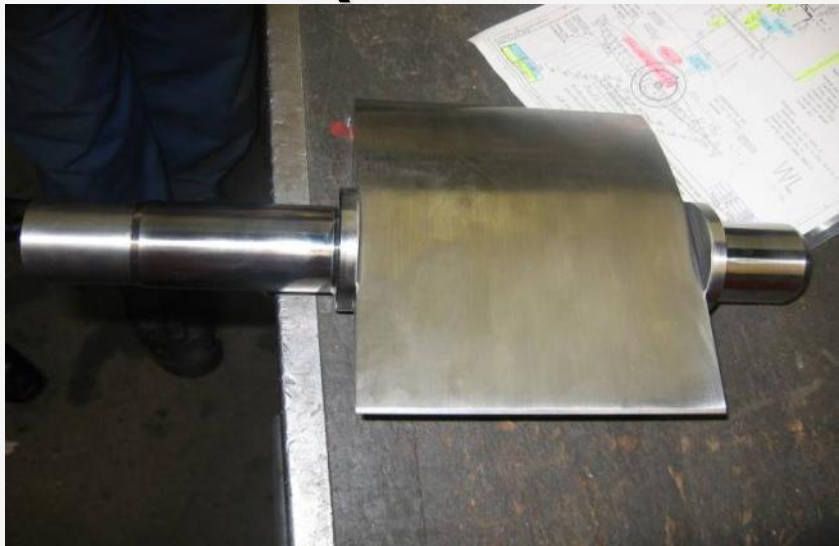
HEAT EXCHANGERS



SERVICES



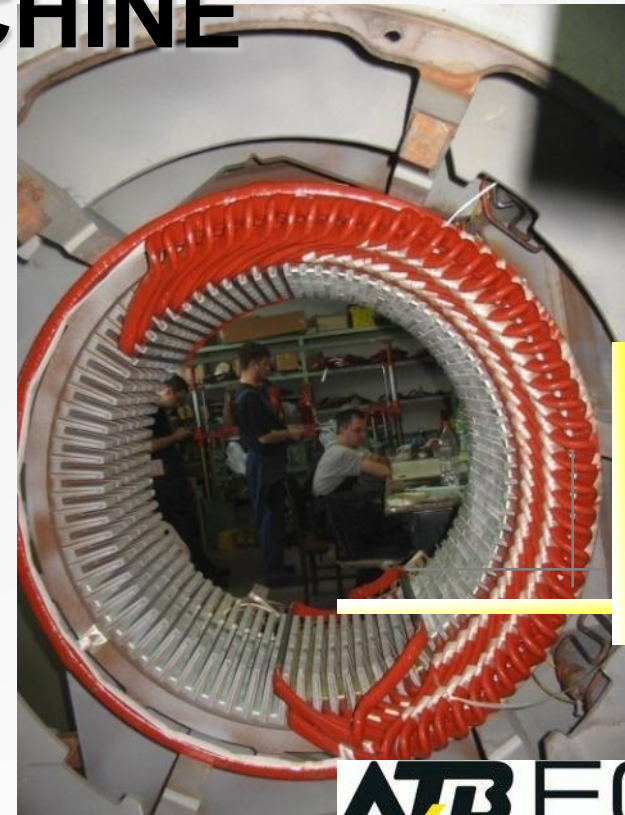
- SPARE PARTS
- (CNC machining)



SERVICES



ELECTRICAL MACHINE OVERHAULING



SERVICES

MECHANICAL ERECTION AND ELECTRICAL, INSTALLATION, ASSEMBLY



PRODUCTION RANGE



HYDRO TURBINES

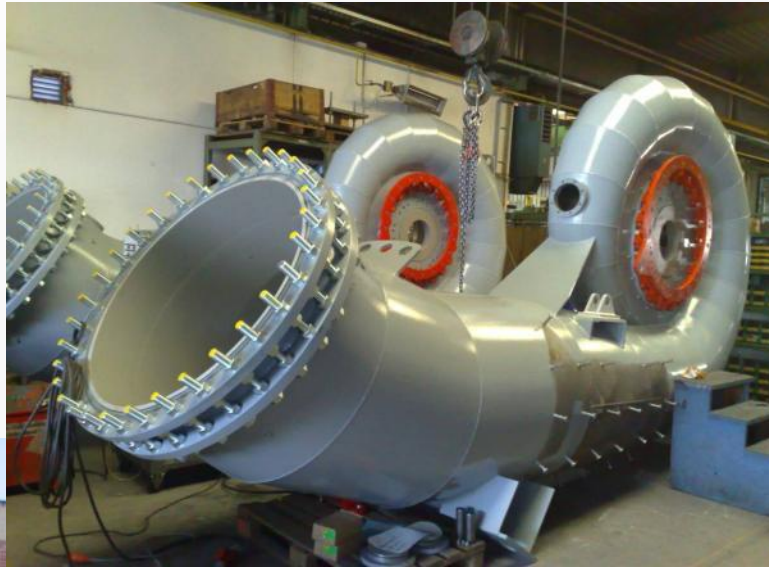


PRODUCTION RANGE

HYDRO TURBINES

FRANCIS TURBINE VOLUTE CASINGS

Power : 0.50 - 12.00 MW



PRODUCTION RANGE **HYDRO TURBINES**



PRODUCTION RANGE

HYDRO TURBINES

KAPLAN TURBINE

Power: 0.40- 5.50 MW



PRODUCTION RANGE HYDRO TURBINES

PIPE TURBINE CASING



PRODUCTION RANGE

HYDRO TURBINES

PELTON TURBINE CASING



PRODUCTION RANGE

HYDRO TURBINES

HORIZONTAL & VERTICAL
FRANSIS TURBINA



PRODUCTION RANGE

HYDRO TURBINES

BATERFLY VALVE OVČAR BANJA & MEDJUVRŠJE

Diameter: 0.6 - 3.00 m

Pressure: 1MPa - 0.3MPa



PRODUCTION RANGE

HYDRO TURBINES

**DISTRIBUTIVE CONES OF KAPLAN
HYDROMATRIX® TURBINES**

ANDRITZ HYDRO, Project Chievo Damm



PRODUCTION RANGE



WELDING



ATB FOD certificates



Certificate in accordance with ISO 9001 – Quality Management System

Certificate in accordance with OHSAS 18001 – Occupational Health and Safety Management System

Certificate in accordance with ISO 14001 – Environmental Management System


CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

**ATB FOD DOO BOR
Djordja Vajferta 16
19210, Bor
Serbia**

has been approved by Lloyd's Register Quality Assurance
to the following Quality Management System Standard:

BS ISO 9001:2008

The Quality Management System is applicable to:

**Development, design, engineering, production and
assembly in field of electro-machine construction.**

Approval
Certificate No: BE06017437

Original Approval: 22 June 2013
Current Certificate: 22 June 2013
Certificate Expiry: 21 June 2016

Issued by: Hellenic Lloyd's S.A. for and on behalf of
Lloyd's Register Quality Assurance Limited


001

This document is subject to the provision on the reverse
71 Fenchurch Street, London EC3M 4BS United Kingdom. Registration number 18799370
This approval is carried out in accordance with the UKAS assessment and certification procedures and monitored by UKAS.
The use of the UKAS Accreditation Mark indicates Accreditation in respect of those activities covered by the Accreditation Certificate Number 001
(www.ukas.co.uk)


CERTIFICATE OF APPROVAL

This is to certify that the Occupational Health & Safety Management System
of:

**ATB FOD DOO BOR
Djordja Vajferta 16
19210, Bor
Serbia**

has been approved by Lloyd's Register Quality Assurance
to the following specification:

OHSAS 18001:2007

The Occupational Health & Safety Management System is applicable to:

**Development, design, engineering, production and
assembly in field of electro-machine construction.**

Approval
Certificate No: BE06017437 / B

Original Approval: 23 June 2013
Current Certificate: 23 June 2013
Certificate Expiry: 22 June 2016

Issued by: Hellenic Lloyd's S.A. for and on behalf of
Lloyd's Register Quality Assurance Limited


001

This document is subject to the provision on the reverse
71 Fenchurch Street, London EC3M 4BS United Kingdom. Registration number 18799370
This approval is carried out in accordance with the UKAS assessment and certification procedures and monitored by UKAS.
(www.ukas.co.uk)


CERTIFICATE OF APPROVAL

This is to certify that the Environmental Management System of:

**ATB FOD DOO BOR
Djordja Vajferta 16
19210, Bor
Serbia**

has been approved by Lloyd's Register Quality Assurance
to the following Environmental Management System Standard:

BS ISO 14001:2004

The Environmental Management System is applicable to:

**Activities including and associated with development,
design, engineering, production and assembly in field of
electro-machine construction.**

Approval
Certificate No: BE06017437 / A

Original Approval: 23 June 2013
Current Certificate: 23 June 2013
Certificate Expiry: 22 June 2016

Issued by: Hellenic Lloyd's S.A. for and on behalf of
Lloyd's Register Quality Assurance Limited


001

This document is subject to the provision on the reverse
71 Fenchurch Street, London EC3M 4BS United Kingdom. Registration number 18799370
This approval is carried out in accordance with the UKAS assessment and certification procedures and monitored by UKAS.
The use of the UKAS Accreditation Mark indicates Accreditation in respect of those activities covered by the Accreditation Certificate Number 001
(www.ukas.co.uk)

Certificate in accordance with EN ISO 3834-2
Quality requirements for fusion welding of
metallic materials - Part 2: Comprehensive
quality requirements

Certificate in accordance with PED 97/23/EC
and other norms - Quality requirements for
pressure equipment welding



SERVICES



NON DESTRUCTIVE TESTING



SERVICES

NON DESTRUCTIVE TESTING

- VT - Visual inspection
- PT - Liquid penetrant testing
- MT - Magnetic particle testing
- UT - Ultrasonic testing

TIC - Zertifizierungsstelle für ZIP - Personal des TÜV Thüringen e.V.
Akkreditierte ZIP - Personalzertifizierungsstelle nach DIN EN ISO 17024, Reg-Nr.: ZLS-ZP-061/09
Anerkannte unabhängige Prüfstelle nach Artikel 13 der Druckgeräte-Richtlinie 97/23/EG, Kenn-Nr. 0090



ZERTIFIKAT / CERTIFICATE / CERTIFICAT

Hiermit zertifizieren wir, dass
We hereby certify that
Nous certifions que

Herr Dragoljub Nejkov

Titel, Vorname, Name / Title, first name, surname / Titre, Prénom, nom

12.10.1963

Bor

Geburtsdatum / Date of birth / Date de naissance

Geburtsort / Place of birth / Lieu de naissance

nach DIN EN 473 kompetent ist für die
is competent according to DIN EN 473 for
est compétent selon DIN EN 473 pour

Visual Testing Level 2 (VT2)

Prüfverfahren, Stufe / NDT method, level / Methode d'essai, niveau

**Sektor c, f, w, t, wp, einschließlich dauerhafter Verbindungen an Druckgeräten
nach Richtlinie 97/23/EG**


Sector c, f, w, t, wp, including permanent joints of pressure equipment according to Directive 97/23/EC
Secteur c, f, w, t, wp, incluant les assemblages permanents des équipements sous pression selon Directive 97/23/EC

Zertifikat Nr.: 2010/0939/901/VT0031

gültig bis: 05/2015

Certificate No.:
Certificat N°

valid to
valable


Unterschrift des Zertifikatsinhaber
Signature of certified person
Signature de la personne de certifiée



Erfurt, 01.06.2010

Ort, Datum / Place, Date / Lieu, Date


TIC - Zertifizierungsstelle
für ZIP-Personal des TÜV Thüringen e.V.

TIC - Zertifizierungsstelle für ZIP - Personal des TÜV Thüringen e.V.
Melchendorfer Straße 64 • ☎ +49 361 / 42 83 0 • 📠 +49 361 / 42 83 24 2

ZIP-Zertifikat

SERVICES

NON DESTRUCTIVE TESTING – TÜV certificates

Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Akkreditierte ZfP - Personenzertifizierungsstelle nach DIN EN ISO 17025, Reg.Nr.: ZLS-ZP-06109
Anerkannte unabhängige Prüfstelle nach Artikel 13 der Druckgeräte-Richtlinie 97/23/EG, Kenn-Nr.: 0090



ZERTIFIKAT / CERTIFICATE / CERTIFICAT

Hiermit zertifizieren wir, dass
We hereby certify that
Nous certifions que

Mr. Dejan Ilić

Titel, Vorname, Name / Title, first name, surname / Titre, Prénom, nom

24.09.1971

Zaječar

Geburtsdatum / Date of birth / Date de naissance

Geburtsort / Place of birth / Lieu de naissance

nach DIN EN 473 die Kompetenz besitzt, für die
according to DIN EN 473 has the competence, for the
conformément à DIN EN 473 la compétence possède, pour laquelle

Penetrant Testing Level 2 (PT2)

Prüfverfahren, Stufe / NDT method, level / Methode d'essai, niveau

Sektor A, B (c,f,w,t,wp) einschließlich dauerhafter Verbindungen an Druckgeräten
nach Richtlinie 97/23/EG

Sector A, B (c,f,w,t,wp) including permanent joints of pressure equipment according to Directive 97/23/EC
Secteur A,B (c,f,w,t,wp) incluant les assemblages permanents des équipements sous pression selon Directive 97/23/EC

Zertifikat Nr.: **2012/0498/901/PT2/021**

Certificate No.:
Certificat N°

gültig bis: **10/2017**

valid to
valable

Gültigkeit des Zertifikats nur
in Zusammenhang mit dem
Zertifikat

027/12

Unterschrift des Zertifikatsinhabers
Signature of certified person
Signature de la personne de certifiée

Erfurt, 30.10.2012

Ort, Datum / Place, Date / Lieu, Date

Zertifizierungsstelle
für ZfP-Personal des TÜV Thüringen e.V.
Die Akkreditierung bezieht sich ausschließlich auf
den Geltungsbereich der Druckgeräterichtlinie

Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Melchendorfer Straße 64, D 99084 Erfurt • ☎ +49 361 / 42 83 0 • ✉ +49 361 / 42 83 24 2

ZfP-Zertifikat

TIC - Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Akkreditierte ZfP - Personenzertifizierungsstelle nach DIN EN ISO 17024, Reg.Nr.: ZLS-ZP-06109
Anerkannte unabhängige Prüfstelle nach Artikel 13 der Druckgeräte-Richtlinie 97/23/EG, Kenn-Nr.: 0090



ZERTIFIKAT / CERTIFICATE / CERTIFICAT

Hiermit zertifizieren wir, dass
We hereby certify that
Nous certifions que

Herr Jovica Krstić

Titel, Vorname, Name / Title, first name, surname / Titre, Prénom, nom

01.10.1962

Studena Babusnica

Geburtsdatum / Date of birth / Date de naissance

Geburtsort / Place of birth / Lieu de naissance

nach DIN EN 473 kompetent ist für die
is competent according to DIN EN 473 for
est compétent selon DIN EN 473 pour

Magnetic Testing Level 2 (MT2)

Prüfverfahren, Stufe / NDT method, level / Methode d'essai, niveau

Sektor c, f, w, t, wp, einschließlich dauerhafter Verbindungen an Druckgeräten
nach Richtlinie 97/23/EG

Sector c, f, w, t, wp, including permanent joints of pressure equipment according to Directive 97/23/EC
Secteur c, f, w, t, wp, incluant les assemblages permanents des équipements sous pression selon Directive 97/23/EC

Zertifikat Nr.: **2010/0939/901/MT0010**

Certificate No.:
Certificat N°

gültig bis: **05/2015**

valid to
valable

Unterschrift des Zertifikatsinhabers
Signature of certified person
Signature de la personne de certifiée



Erfurt, 01.06.2010

Ort, Datum / Place, Date / Lieu, Date

TIC - Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Melchendorfer Straße 64 • ☎ +49 361 / 42 83 0 • ✉ +49 361 / 42 83 24 2

ZfP-Zertifikat

TIC - Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Akkreditierte ZfP - Personenzertifizierungsstelle nach DIN EN ISO 17024, Reg.Nr.: ZLS-ZP-06109
Anerkannte unabhängige Prüfstelle nach Artikel 13 der Druckgeräte-Richtlinie 97/23/EG, Kenn-Nr.: 0090



ZERTIFIKAT / CERTIFICATE / CERTIFICAT

Hiermit zertifizieren wir, dass
We hereby certify that
Nous certifions que

Herr Vukman Milovanović

Titel, Vorname, Name / Title, first name, surname / Titre, Prénom, nom

03.11.1957

Krtok, Kursumlija

Geburtsdatum / Date of birth / Date de naissance

Geburtsort / Place of birth / Lieu de naissance

nach DIN EN 473 kompetent ist für die
is competent according to DIN EN 473 for
est compétent selon DIN EN 473 pour

Ultrasonic Testing Level 2 (UT2)

Prüfverfahren, Stufe / NDT method, level / Methode d'essai, niveau

Sektor c, f, w, t, wp, einschließlich dauerhafter Verbindungen an Druckgeräten
nach Richtlinie 97/23/EG

Sector c, f, w, t, wp, including permanent joints of pressure equipment according to Directive 97/23/EC
Secteur c, f, w, t, wp, incluant les assemblages permanents des équipements sous pression selon Directive 97/23/EC

Zertifikat Nr.: **2010/0939/901/UT0007**

Certificate No.:
Certificat N°

gültig bis: **05/2015**

valid to
valable

Unterschrift des Zertifikatsinhabers
Signature of certified person
Signature de la personne de certifiée



Erfurt, 01.06.2010

Ort, Datum / Place, Date / Lieu, Date

TIC - Zertifizierungsstelle für ZfP - Personal des TÜV Thüringen e.V.
Melchendorfer Straße 64 • ☎ +49 361 / 42 83 0 • ✉ +49 361 / 42 83 24 2

ZfP-Zertifikat

NON DESTRUCTIVE TESTING

- Inspection of turbine parts

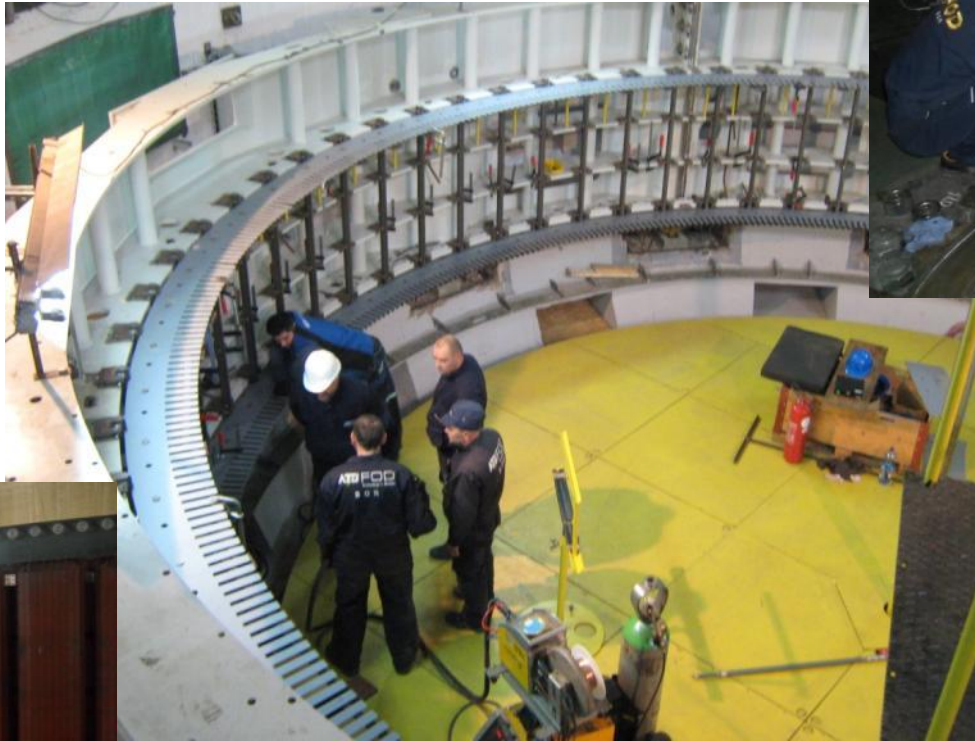


- PT – Guide Vane

PRODUCTION RANGE

HYDRO TURBINES

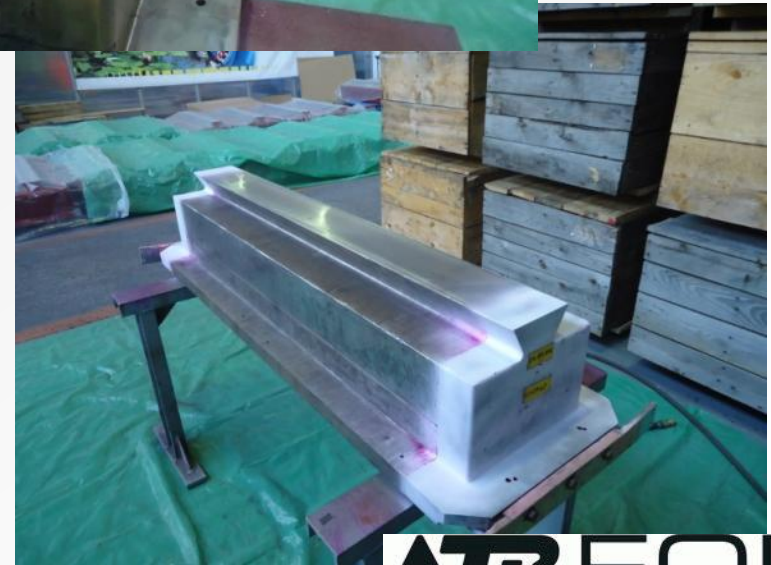
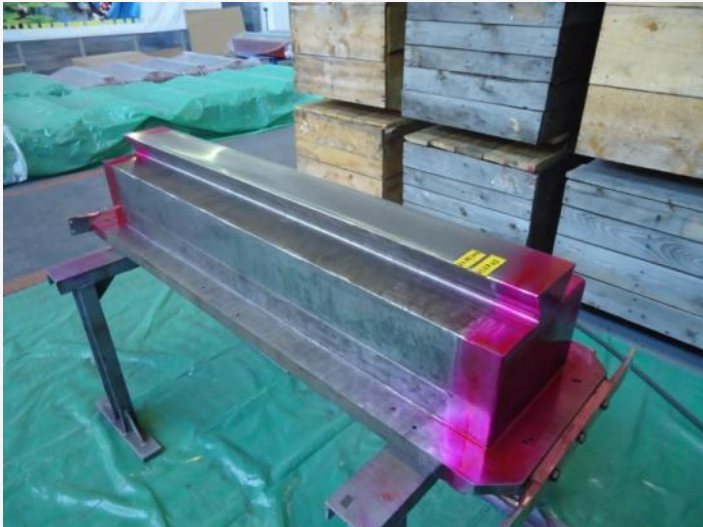
Non Destructive Testing – VT / MT
Hydropower Plant Bajina Bašta




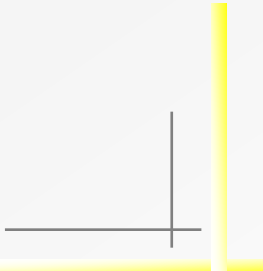
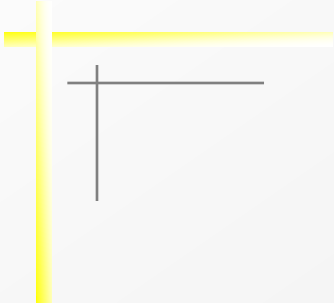
SERVICES

NON DESTRUCTIVE TESTING

Inspection of rotor sides of
a generator – PT / UT

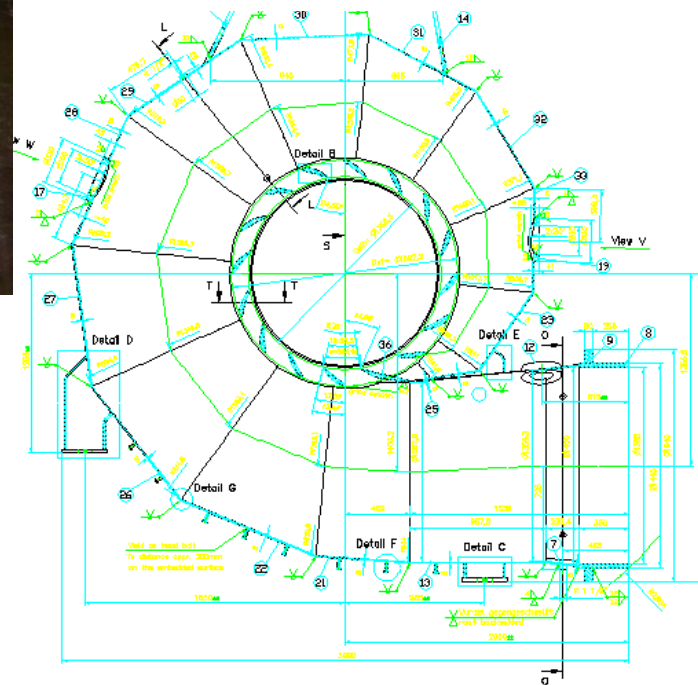
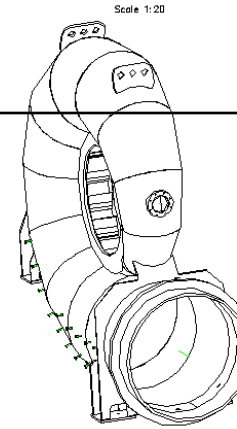




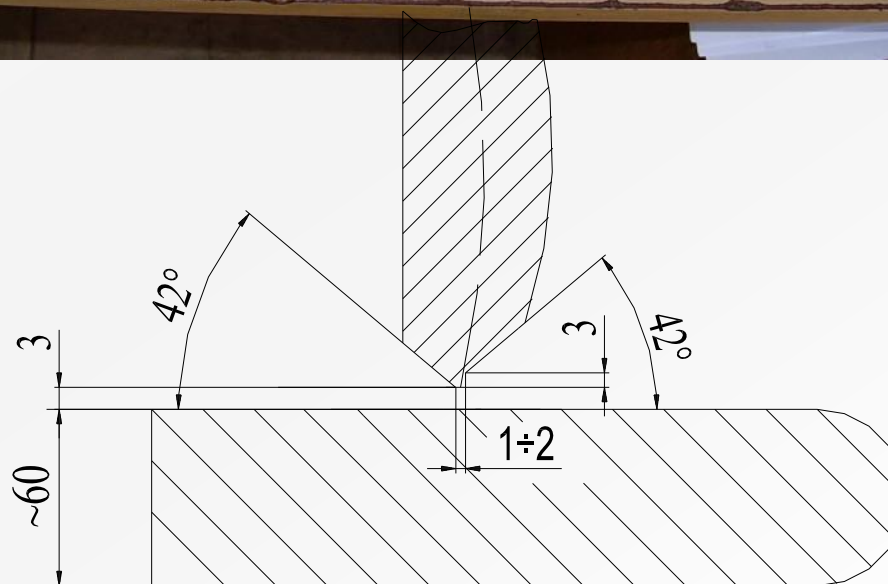


FRANCIS TURINE STAY VANE RING WELDING AND NON-DESTRUCTIVE TESTING

WELDING OF STAY VANE RING



WELDING OF STAY VANE RING



WPS (Welding Procedure Specification)

Welding Instruction

ATB FOD Technology in Motion		SPECIFIKACIJA TEHNOLOGIJE ZAVARIVANJA Welding Procedure Specification (WPS)				List-Sheet 1 Listova-Sheets 1
Proizvođač-Producer: ATB FOD		WPS Br.-WPS No.: 138801001		Standard-Standard: SRPS EN ISO 15609-1		
Ispitna org.-Testing Org.: TÜV Thüringen		WPAR Br.-WPAR No.: Z-27589/13		Pod. važ.-Domain of Validity:		
Priprema Zleba -Design of Weld Joint (Sketch)				Redosled zavarivanja-Welding Sequences		
141 / 111 / EN ISO 5817-C / ISO 6947 PB EN ISO 21952-A : W2Mo EN ISO 2560-A : E 42 4 B 32 H5						
PARAMETRI ZAVARIVANJA - Welding parameters						
Zavar Layers	Postupak Process	DODATNI MATERIJAL Filler Material		STRUJA ZAVARIVANJA Current of Welding		Brzina dodav žice (cm/min) Electrode Feed speed
		Naziv Name	Prečnik (mm) Diameter	Jačina (A) Amperage	Napon (V) Voltage	Polaritet Polarity
1-3,5,6,7	141	TIG Mo	Ø2,5	170-220	12-15	DC (-)
8+10	141	TIG Mo	Ø3	200-250	12-15	DC (-)
11+14	111	EV5-50	Ø3,25	110-140	22-25	DC (+)
popuna	111	EV5-50	Ø4	150-170	23-26	DC (+)
OSNOVNI MATERIJAL - Base Material						
Standard-Standard		EN 10025-2				
Oznaka-Type		S355J2 +N				
Dimenzije (mm)- Size		#35 / #60				
DODATNI MATERIJAL - Filler Material						
Standard-Standard		EN ISO 21952-A / EN ISO 2560-A				
Oznaka-Type		W MoSi / E 42 4 B 32 H5				
Dimenzije (mm)- Size		Temp.sušenja (°C)-Drying temp. 400°C / 1h				
PREDGREVANJE I TERMIČKA OBRADA POSLE ZAVARIVANJA - Preheat And Postweld Heat Treatment						
PREDGREVANJE Preheat		TERMIČKA OBRADA POSLE ZAVARIVANJA Postweld Heat Treatment				
Brzina zagrevanja (°C/h) Heating Rate		100°C/h				
Temperatura(°C) i Vreme zadržavanja(h) Temp. And Holding Time		T _p =180°C sve vreme zavarivanja all time of welding 600°C / 45'				
Meduprolazna temper. Interpass Temperature		T _{max} =250°C				
Brzina hlađenja(°C/h) Cooling Rate		100°C / 1h				
Medijum za hlađenje Cooling Medium		termo-pokrivač / thermo covarlet Peć bez otvaranja / In furnace without opening				
VOLFRAM ELEKTRODA - Tungsten Electrode						
Tip-Type		WT 20				
Prečnik-Size		Ø2,4				
Položaj žleba-Position PA, PB		Polaganje slojeva-Laying naizmenično-redno respectively- layers				
ZAŠTITNI GAS-Shielding Gas (Composition %)		Meduprolazno čišćenje Interpass Cleaning Brušenje - grinding Završno čišćenje-End Cleaning Brušenje - grinding R8				
Lic-Face		Koren-Root				
EN ISO 14175: I1 (argon)		I				
NAPOMENE-Annotations						
Kössler - Banesti Floresti gr - 5627,RN 88010 - drw.no.051.09180.V1.210a -Stay Vane Ring						
Lopaticе obraditi na l=210mm, a odstojnike izraditi na L=303,5 ±0,1mm.						
Prvi potkoreni prolaz (br.4) izvesti TIG postupkom bez dodatnog materijala.						
Ispitivanja / Examination: - VT, MT, UT -100%						
IZRADIO - Arranged by:						
Datum-Date 03.04.2014.		Ime i prezime-Prepared by Dejan Ilić, SI IWE 00008			Potpis-Signature Dejan Ilić	

ATB FOD Technology in Motion		UPUTSTVO ZA ZAVARIVANJE Welding Instruction No. UZZ 138801001 (acc. WPS No. 138801001)				List Sheet: 1 RN: 88010
Radna jedinica-Organisation: ATB FOD		Radionica.-Workshop: 220		Radno mesto - Workplace: 2281		
Naziv dela-Part Name: Statorski prsten spratnog koluta-Stay Vane Ring		Crtaz-Position-Details: 051.09180.V1.210a		Drw.Nº-Pos-Details: 37, 36 / 38,39		
Naručilac-Client: Kössler						
Priprema Zleba -Design of Weld Joint (Sketch)				Redosled zavarivanja-Welding Sequences		
141 / 111 / EN ISO 5817-C / ISO 6947 PB EN ISO 21952-A : W2Mo EN ISO 2560-A : E 42 4 B 32 H5						
Meduprol.čišć-Interpass Cleaning Brušenje - grinding Završno čišćenje-End Cleaning Brušenje - grinding R8						
PLAN ZAVARIVANJA - Plan of welding						
- Obavezno postavljati po dva odstojnika od debelozodnih okruglih cevi u zoni lopatica prikom zavarivanja svake lopatice, osim one koja se trenutno zavaruje gde je odstojnik samo sa suprotne strane od one koja se zavaruje						
PARAMETRI ZAVARIVANJA - Welding parameters						
Zavar Layers	Postupak Process	DODATNI MATERIJAL Filler Material		STRUJA ZAVARIVANJA Current of Welding		Brzina dodav žice (cm/min) Electrode Feed speed
		Naziv Name	Prečnik (mm) Diameter	Jačina (A) Amperage	Napon (V) Voltage	Polaritet Polarity
1-3,5,6	141	TIG Mo	Ø2,5	170-220	12-15	DC (-)
7+10	141	TIG Mo	Ø3	200-250	12-15	DC (-)
11+14	111	EV5-50	Ø3,25	110-140	22-25	DC (+)
popuna	111	EV5-50	Ø4	150-170	23-26	DC (+)
OSNOVNI I DODATNI MATERIJAL - Base And Filler Material						
Oznaka-Type		Dimenzije (mm) Size		PREDGREVANJE Preheat		
S355J2 +N		#35 / #60		TERMIČKA OBRADA Heat Treatment		
Osnovni materijal Base Material		S355J2 +N		Temperatura(°C) i Vreme zadržavanja(h) Temp. And Holding Time		
Dodatni materijal Filler Material		EN ISO 21952-A: W2Mo EN ISO 2560-A: E 42 4 B 32 H5		T _p =180°C sve vreme zavarivanja all time of welding 600°C / 45'		
Volfram elektroda Tungsten electrode		WT20		Brzina zagrevanja (°C/h) Heating Rate		
		Ø2,4		100 °C/h		
		Ø2,5 / Ø4		Brzina hlađenja(°C/h) Cooling Rate		
				Lagano sa termo-pokrivačem Slow - thermo covered 100°C / 1h		
OSTALO-Annotations						
Lopaticе obraditi na l=297,5mm, a odstojnike izraditi na L=303,5mm; Prvi potkoreni prolaz (br.4) izvesti TIG postupkom bez dodatnog materijala.		VT		PT/MT		RT UT
		100%		100%		100%
IZRADIO - Arranged by:						
Datum-Date 03.04.2014.		Ime i prezime-Prepared by Dejan Ilić, SI IWE 00008			Potpis-Signature Dejan Ilić	

WPQR (Welding Procedure Qualification Record)



Zertifizierungsstelle für Druckgeräte
Certification Body for Pressure Equipment
des/of TÜV Thüringen e.V.



Anerkennung eines Schweißverfahrens (WPQR) Acceptance of welding procedure (WPQR) Zertifikat-Nr./ Certificate No.: Z-27589/13

2 WPQR-Nr./ WPQR-No.: 1004-3-13 Seite/ page: 1 von/ of 1
3 Prüfl.-Nr. / Test No.: 1004-3-13 Prüfstelle/ test laboratory: TÜV Adria - SRB
4 Zertifizierungsstelle/ Certification body: TÜV Thüringen e.V.
5 Hersteller/ Manufacturer: "ATB FOD" DOO
6 Anschrift/ Address: Djordja Vajferta 16, SRB - 19210 Bor
7 Regeln, Prüfnorm/ Codes, test standards: ISO 15614-1:2012
8 Datum der Schweißung/ Date of welding: 2013-02-23
9 Schweißprozeß/ Welding process: Kombinationsprozesse / combination of processes: 141/111 (WIG handschweißen / E Lichtbogenhandschweißen) (GTAW manual welding / SMAW manual welding)
11 Nahtart/ Type of joint: Stumpfnah (BW), Kehlnah (FW), Abzweig $\geq 60^\circ$, voll und teilweise Durchschweißung, einseitig / beidseitig, mehrlagig schweißen ohne / mit Badsicherung, ohne / mit Ausfugen
Butt weld (BW), Fillet weld (FW), branch connection $\geq 60^\circ$, full and partial penetration, single side / both side, multi layer welding, without / with backing, without / with gouging
12 Nahtform/ Form of joint: V, Y, 1/2Y, K, X und/and T Stoßform
13 Grundwerkstoff(e)/ parent material(s): Stähle der Gruppe 1 nach CR ISO 15608 mit Streckgrenze $R_{m} \leq 235$ Mpa
Steels from group 1 acc. to CR ISO 15608 with yield point $R_{m} \leq 235$ Mpa
Geschweißter Stahl / welded steel: P235TR1 (W. Nr. 1.0254) nach / acc. to EN 10216-1.08.02
14 Dicke des Grundwerkstoff(s)/ Parent metal thickness [mm]: Von/ 5,2 Bis/ 25,0
From: To:
15 Außendurchmesser/ Outside diameter [mm]: $\geq 64,1$ Schweißgutdicke / welding deposit thickness - (141/111): 12,5 mm
16 Anwendungstemperatur / application temperature [°C]: Wie Grund- bzw. Zusatzwerkstoff, jedoch nicht tiefer als -20°C**
Ac base or weld metal respectively, but not lower than -20°C**
** - siehe folgende Seite / see following page
17 Art des Zusatzwerkstoffes/ Filler metal type
Werkstoff-Nr. / Material-No.: (141): WIG Schweißstab / GTAW welding rod
Normbezeichnung/ Standard designation: (111): E Schweißstab / SMAW welding stick
(141): AWS A5.18-01: ER70S-2; (111): ISO 2560-A: E 42 4 B 32 H5
18 Schutzgas/ Shielding gas: (141): If nach / acc. to ISO 14175
Wurzelschutzgas/ Backing gas: (141): Ohne / mit Wurzelschutzgas (Formiergas) / Without / with backing (forming) gas
19 Schweißpositionen/ Welding position: Alle ausgenommen PG und J-L045 / all excluded PG and J-L045
20 Vorwärmung/ Preheat: Keine / without
21 Stromart/ Type of welding current: (141): = / - (DC"/" / G minus); (111): = / + (DC"/" / G plus)
22 Lichtbogenart/ Type of arc: n.z. / n.a.
23 Wärmehandhabung/ Post weld heat treatment: Keine / without
24 Sonstige Angaben/ Other information: Kehlnahtdicke / Throat thickness in a fillet weld [mm]: Keine Einschränkung / no limitation
Durchmesser des Zusatzwerkstoffes / Diameter of filler material [mm]: 2,4; 3,25 und andere gemäß / and others acc. to ISO 15614-1:2012, Abs. 9.4.6
Zwischenlagentemperatur / Interpass temperature [°C]: ≤ 260
Wärmeeinbringung / Heat input Q [kJ/mm]: $0,59 \pm 1,05$
Gültigkeit der Prüfung / Validity of Approval: -

25 Ort/ Location: D - Erfurt Datum der Ausstellung/ Date of issue: 2013-04-30
27 TÜV Thüringen e.V. Phone: 0361/42830
Melchendorfer Str. 64 Fax: 0361/428342
99096 Erfurt info@tuv-thueringen.de

Dipl.-Ing. C. Lange
Zertifizierungsstelle für Druckgeräte
des TÜV Thüringen e.V. Kenn-Nummer: 0090
Certification Body for Pressure Equipment
of TÜV Thüringen e.V. Reg.-No.: 0090

* sowie eignungsgeprüfte Zusatzwerkstoffe anderer Hersteller/ also tested filler materials of other manufacturers

Welder's certificate

Technischer Überwachungsverein Thüringen e.V.
Melchendorfer Str. 64, 99096 Erfurt
Tel. 0361 42 83 0, Fax 0361 42 83 242



Schweißer-Prüfungsbescheinigung Registrier-Nr. Z - 38728/13

2 Bezeichnung: EN 287-1 141/111 T BW 1.1 S/B t12.5(4.0/8.5) D168.3 PH ss nb/mb
(141 T BW 1.1 S t4.0 D168.3 PH ss nb / 111 T BW 1.1 B t8.5 D168.3 PH ss mb)
3 Seite: 1 von 1
4 WPS - Bezug: pWPS: 102/13 Prüfstelle: TÜV Thüringen
5 BOX DI Prüf-Nr.: 1004
6 Name des Schweißers: Nebojsa JOTOVIC (050)
7 Legitimation: 139845
8 Art der Legitimation: Personalausweis
9 Geburtsdatum und -ort: 15. Juli 1972, Bor, Serbien
10 Arbeitgeber: ATB FOD d.o.o. - Bor, Serbien
11 Vorschrift/Prüfnorm: EN 287-1:2011
12 Ergänzende Kehlnahprüfung: Nein
13 Fachkunde: Bestanden

Fotografie
(falls nötig)

14	Prüfstück	Geltungsbereich
15 Schweißprozesse	Wurzel: 141 Füllung: 111	141, 142, 143, 145, 111
16 Produktform (Blech oder Rohr)	T	T, P
17 Nahtart	BW	BW
18 Werkstoffgruppe(n)	1.1	1.1, 1.2, 1.4
19 Schweißzusatz	141: S 111: B	Wurzel: S; Füllung: B, A, RA, RB, RC, RR, R - S, nm, M
20 Schutzgas	EN ISO 14175-11	
21 Hilfsstoffe (z.B. Formiergas)	-	
22 Schweißgutdicke (mm)	141: 4,0 111: 8,5	141/111: $\geq 5,0$ mm; 141: 3,0 - 8,0; 111: 3,0 - 17,0 mm
23 Rohraußendurchmesser (mm)	168,3	$\geq 84,2$ mm
24 Schweißposition	PH	PA, PE, PF, PH
25 Schweißnahtwinkel	141: ss nb 111: ss mb	141: ss mb, ss nb; bs; 111: ss mb; bs; 141/111: ss nb

26 Zusätzliche Hinweise: Prüfung im Rahmen der Verfahrensprüfung Z-27589/13.
Werkstoff: P235TR1 (1.0254).
Zusatz: AWS A5.18-01: ER70S-2 (ER 70 S-2, Bohrer, AUT), ISO 2560-A: E 42 4 B 32 H5 (EVB 50, Elektrode-Jesona, Si)
Qualifiziert für Rohrwinkel $\geq 60^\circ$ / Qualified for branch angles $\geq 60^\circ$.

27	Prüfungsart	Ausgeführt und anerkannt	Nicht gefordert
28 Sichtprüfung	X	-	-
29 Durchstrahlungsprüfung	X	-	-
30 Bruchprüfung	-	X	-
31 Biegeprüfung	-	X	-
32 Kerbzugprüfung	-	X	-
33 Makroskopische Untersuchungen	-	X	-
34 Zusätzliche Prüfungen	-	X	-

36 Bestätigung der Gültigkeit durch den Arbeitgeber / die Schweißaufsichtsperson für die folgenden 6 Monate (unter Bezug auf 9.2)

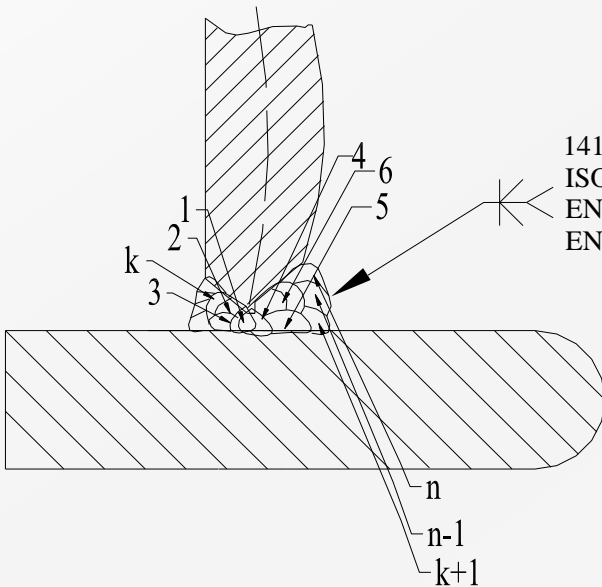
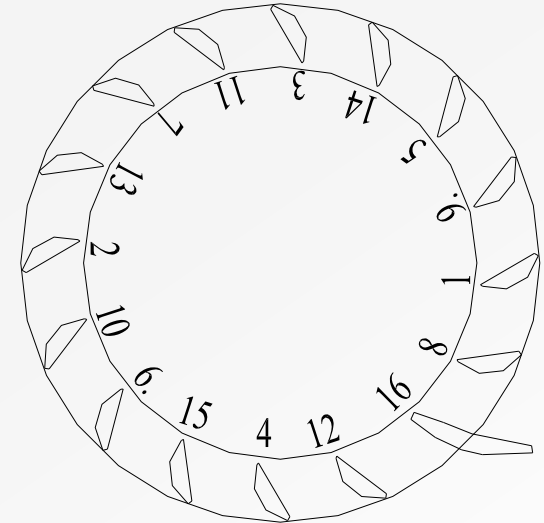
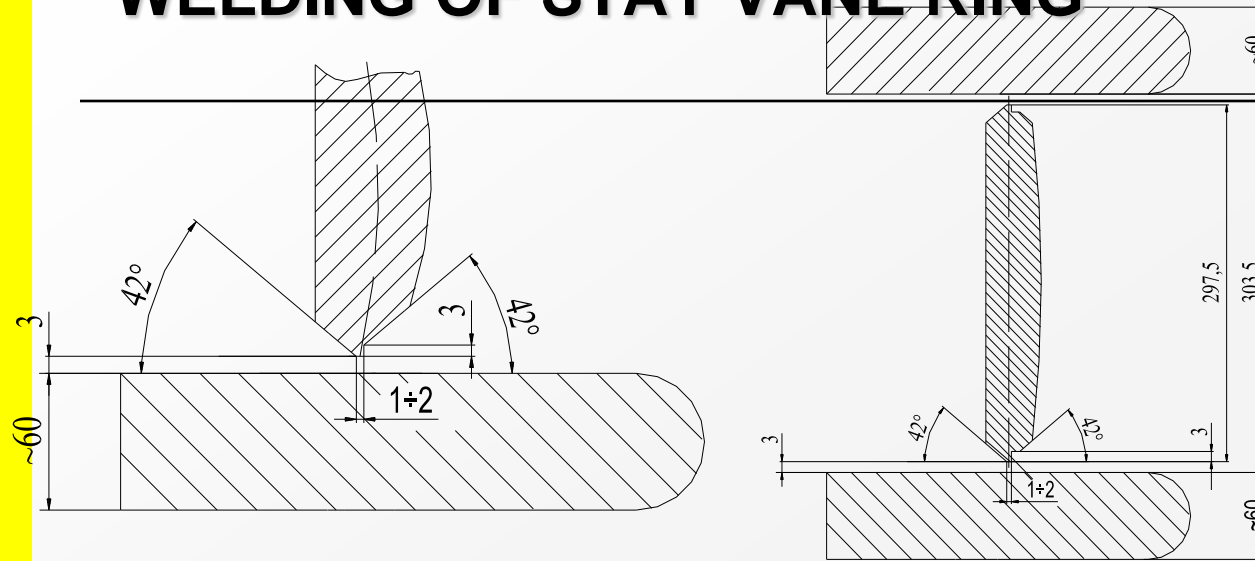
Ort, Datum: SRB - Belgrad, 27.04.2013
Tag der Schweißung: 23. Februar 2013
Gültigkeitsdauer bis: 22. Februar 2015

Verlängerung der Qualifizierung durch den Prüfer oder die Prüfstelle für die nächsten 2 Jahre (Bezug auf 9.3)

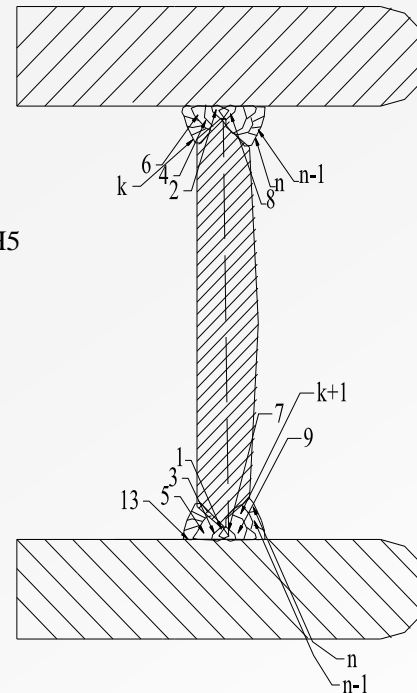
Datum	Unterschrift	Dienststellung oder Titel	Datum	Unterschrift	Dienststellung oder Titel

Übersetzung des Formblattes auf der Rückseite • Translation of printed text on the reverse side • Traduction des rubriques imprimées au verso
6.1021108-2008

WELDING OF STAY VANE RING



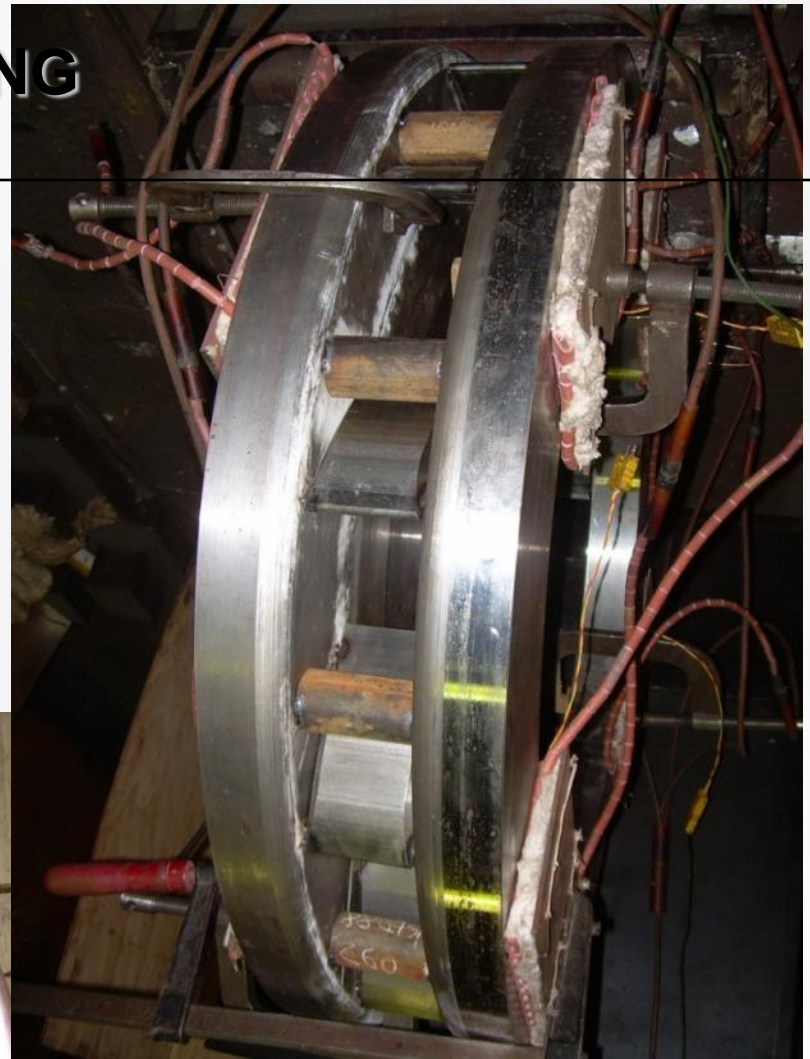
141 / 111 / EN ISO 5817-C/
ISO 6947 PB
EN ISO 21952-A : W2Mo
EN ISO 2560-A : E 42 4 B 32 H5



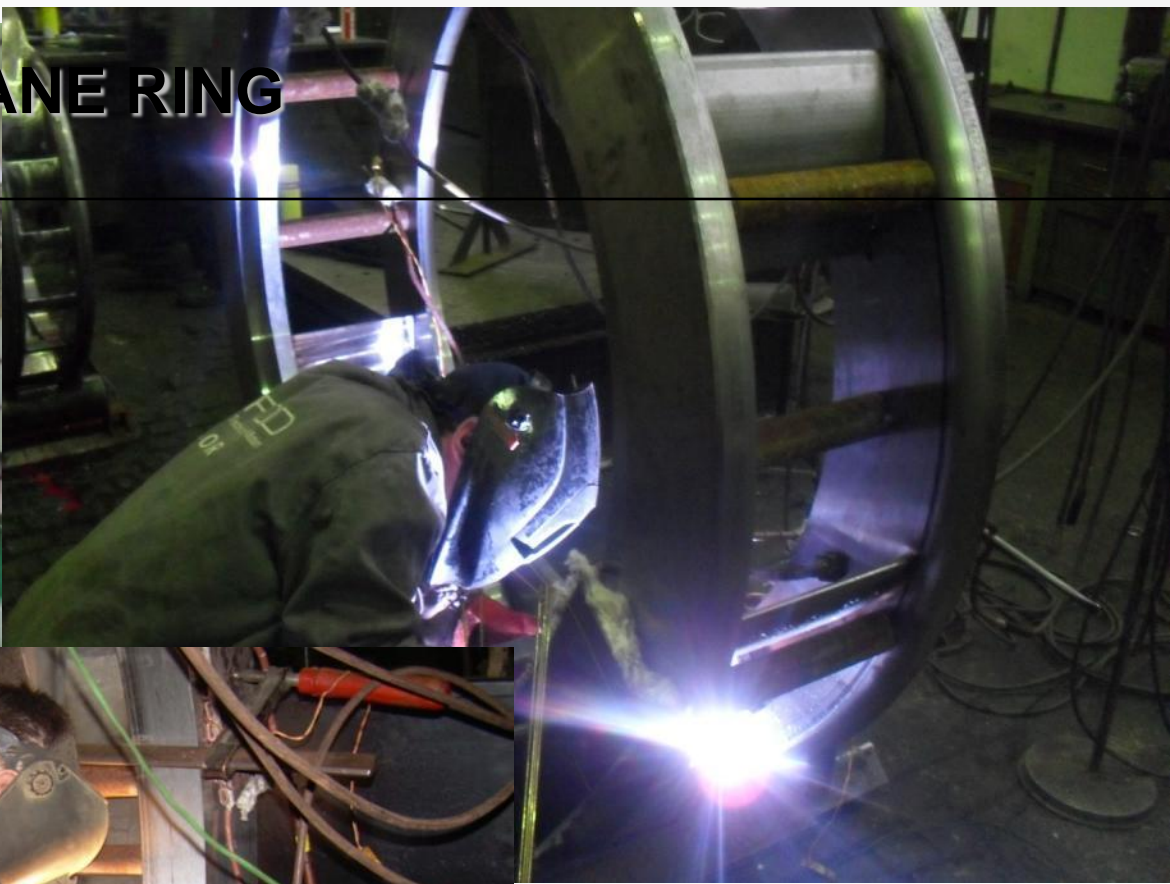
WELDING OF STAY VANE RING



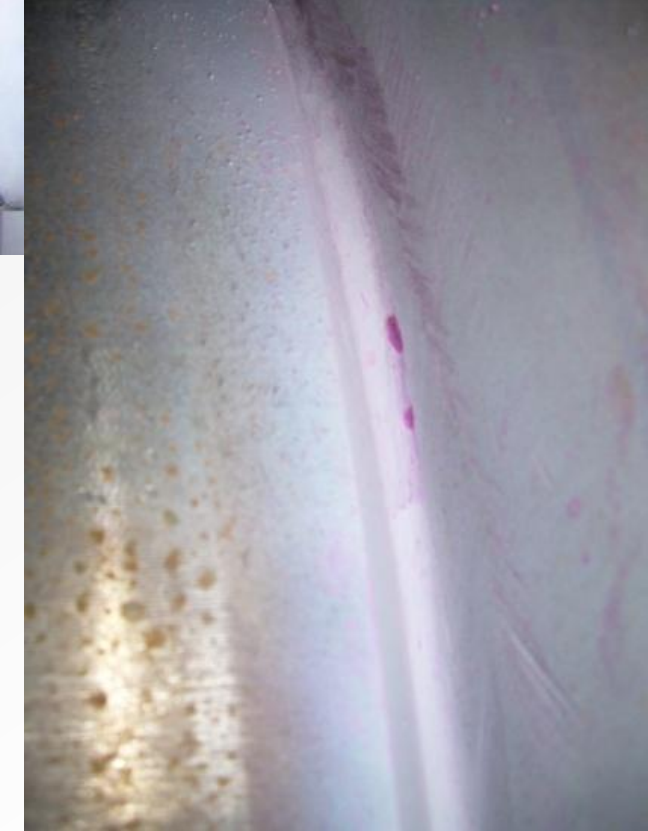
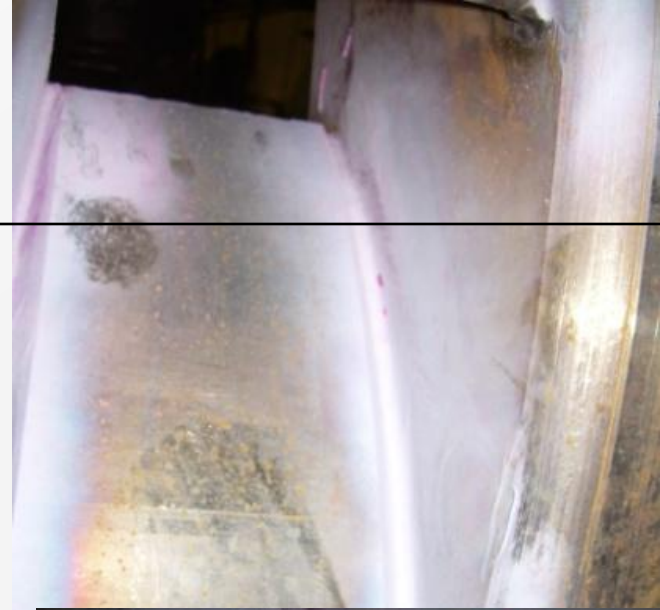
WELDING OF STAY VANE RING



WELDING OF STAY VANE RING



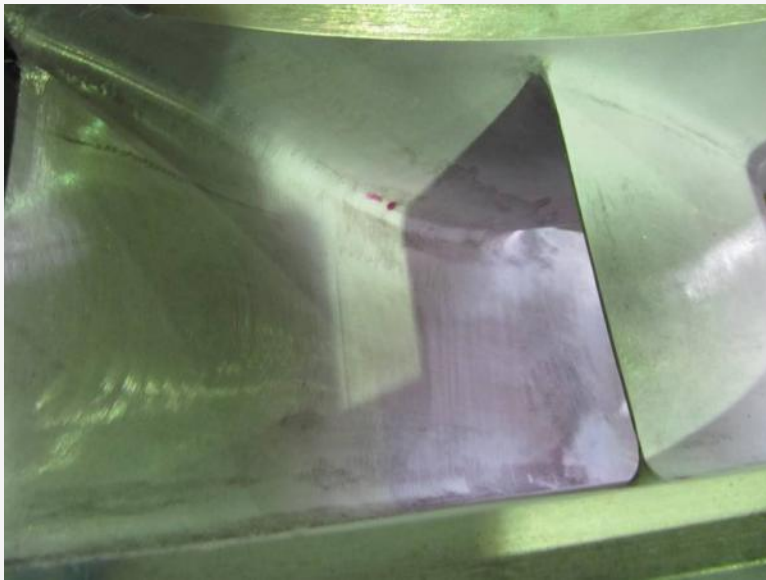
WELDING OF STAY VANE RING



EXAMINATION OF STAY VANE RING



EXAMINATION OF STAY VANE RING



EXAMINATION OF STAY VANE RING





SUMMARY/CONCLUSION

- Preparation for welding
- Welding method
- Compliance with the welding sequence and welding plan
- Continuous inspection and testing

are crucial for achieving satisfactory results both in the quality of welded seams, as well as in geometry of the items to be welded.





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Structural Funds
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Thank you for your attention!



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