



WELDING CONSUMABLE CERTIFICATE

Certificate No.: 650920-3683649-001_____

Report No.: SQ3683649-A_____

Port of: Shanghai, P.R.China_____

Date: 26 August 2019_____

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR PLANT AT SUZHOU, P.R.CHINA, ON THE 06TH DAY OF JUNE, 2019 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE ANNUAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SHIELDED METAL ARC WELDING SECTION:

<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TS-308L	AWS A5.4	E308L-16	--	ALL F	AC/DCEP	Ø2.6~Ø4.0 Ø5.0
TS-309L	AWS A5.4	E309L-16	--	ALL F	AC/DCEP	Ø2.6~Ø4.0 Ø5.0
TS-316L	AWS A5.4	E316L-16	--	ALL F	AC/DCEP	Ø2.6~Ø4.0 Ø5.0
TL-508	ABS	3Y	--	ALL	AC/DCEP	Ø2.6~Ø5.0
TS-308LT	AWS A5.4	E308L-16	--	ALL	AC/DCEP	Ø3.2, Ø4.0
Note: The manufacturer's guaranteed properties: Impact Value: 29 J at -196 °C						
TL-507	ABS	3Y	--	ALL F	DCEP	Ø2.6~Ø4.0 Ø5.0
TS-2209	AWS A5.4M	E2209-16	--	ALL	AC/DCEP	Ø3.2~Ø4.0


Fu, Ai-Qing SURVEYOR

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ABS

WELDING CONSUMABLE CERTIFICATE

Certificate No.: 650920-3658678-001_____

Report No.: SQ3658678-A_____

Port of: Shanghai, P.R.China_____

Date: 26 August 2019_____

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR PLANT AT SUZHOU, P.R.CHINA, ON THE 16TH DAY OF APRIL, 2019 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE INITIAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SUBMERGED ARC WELDING SECTION:

<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TSW-14H/TF-560	ABS	4Y400TMH5	--	F	AC/DCEP	Ø2.4-Ø5.0
WIRE: TSW-14H TO BE USED TOGETHER WITH FLUX: TF-560 MANUFACTURED BY TIEN TAI ELECTRODE CO., LTD.						
TSW-14H *2/TF-560	ABS	4Y400TMH5	--	F	AC/DCEP	Ø2.4-Ø5.0
WIRE: TSW-14H TO BE USED TOGETHER WITH FLUX: TF-560 MANUFACTURED BY TIEN TAI ELECTRODE CO., LTD.						



Fu, Ai-Qing SURVEYOR

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WELDING CONSUMABLE MARKETING CERTIFICATE

Certificate No.: 650920-3719608-001_____

Report No.: SQ3719608-A_____

Port of: Shanghai, P.R.China_____

Date: 26 August 2019_____

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF MARKETING COMPANY TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR FACILITY AT SUZHOU, P.R.CHINA, ON THE 06TH DAY OF JUNE, 2019, AND SUBSEQUENT DATES, IN ORDER TO CARRY OUT A SURVEY OF FACILITIES AND ASSOCIATED HANDLING/ STORAGE CONTROL PROCEDURES IN ACCORDANCE WITH ABS PROCESS FOR APPROVAL OF FIRMS MARKETING WELDING CONSUMABLES AND,

THAT THE FACILITY OF THE ELECTRODE MANUFACTURER SUPPLYING THE MARKETING COMPANY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT BASED ON CERTIFICATION TESTS WITNESSED BY ABS CONFIRMED AT THIS TIME, AND THAT EACH WELDING CONSUMABLE LISTED BELOW IS CONSIDERED IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SUBMERGED ARC WELDING SECTION:

<u>BRAND NAME (OEM)</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TW-308L / TFS-300NB	Manufacturer*	Stainless **	--	F	DCEP	Ø2.0~Ø4.0mm

* Manufacturer's guaranteed minimum properties Y.S. 320 MPa, T.S. 520 MPa, El. 35%, Impact Value Min. 34J@-196 Degree C; Wire composition according to AWS A5.9-12 ER308L.

** Intended for welding of duplex stainless steel for corrosion resistance applications.

Expiry Date: 25 August 2020 or OEM certification expired whichever occurs first


Fu, Ai-Qing SURVEYOR

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ABS

WELDING CONSUMABLE MANUFACTURER APPROVAL PLANT SURVEY

PID: 4328636__

FILE REF: S-6_____

REPORT NUMBER: SQ3719608-A_____

WCN: 650920_____

PORT: Shanghai, P.R.China_____

DATE: 26 August 2019_____

MANUFACTURER NAME: Tien Tai Electrode (Kunshan) Co., Ltd._____

ADDRESS: No.189, Huayuan Road, Zhangpu Town, Kunshan City, Jiangsu, P. R. China_____

MMdb Contact Information – For sending Annual Endorsement and Renewal email notifications

CLIENT CONTACT: Ms. Yao Kai-Rong_____ EMAIL: kairong.yao@itwweld.com_____

TELEPHONE: 008651250167825_____ EMAIL: kairong.yao@itwweld.com_____

TRADE NAME: AS SHOWN ON ACCOMPANYING CERTIFICATE_____

IMPORTANT ASPECTS OF WELDING CONSUMABLE MANUFACTURING CONTROLS

1. Procedure governing the mixing of raw materials to produce uniform coatings and fluxes:
SATISFACTORY

2. Identification system for the control of in-house material:
SATISFACTORY

3. Procedure governing baking of electrodes, flux-cored wire and fluxes:
SATISFACTORY

4. Concentricity checks of covered electrode coatings:
NA

5. Uniformity and flux fill check of flux cored wire:
NA


6. Diameter check of solid and flux-cored wire:
SATISFACTORY

7. Condition of heating equipment for baking/drying coated electrodes:
NA

8. Acceptance and rejection criteria of defects in coated electrodes:
NA

9. Verification of Charpy V-Notch specimens dimensions (notch angle, radius, squareness and cross-sectional area):
NA

10. Verification of finished products from outside procedures:
NA


Fu, Ai-Qing Surveyor

26 August 2019_____
Date



WELDING CONSUMABLE CERTIFICATE

Certificate No.: 650920-3683649-002 _____

Report No.: SQ3683649-A _____

Port of: Shanghai, P.R.China _____

Date: 26 August 2019 _____

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR PLANT AT SUZHOU, P.R.CHINA, ON THE 06TH DAY OF JUNE, 2019 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE ANNUAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE FLUX CORED ARC WELDING SECTION:

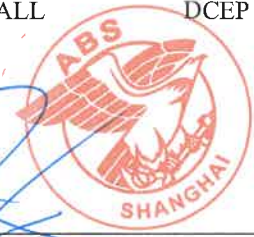
<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TM-70C ✓	ABS	3YAH10	100%CO2	F, H	DCEP	Ø1.2~Ø1.6
TM-70C ✓	ABS	3YSAH10	100%CO2	F, H	DCEP	Ø1.2~Ø1.6
TWE-110K3	ABS	4YQ690SAH5	100%CO2	ALL	DCEP	Ø1.1, Ø1.2
TWE-712	ABS	3YSAH10	100%CO2	ALL, V-DOWN	DCEP	Ø1.2~Ø1.6
TFW-308L	AWS A5.22	E308LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6
TFW-309L	AWS A5.22	E309LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6
TFW-316L ✓	AWS A5.22	E316LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6
TWE-81K2 ✓	ABS	5YQ460SAH5	100%CO2	ALL	DCEP	Ø1.2
TWE-81K2C	ABS	5Y400SAH5	100%CO2	ALL	DCEP	Ø1.2, Ø1.4
TFW-2209 ✓	AWS A5.22	E2209T1-4	100%CO2	ALL	DCEP	Ø1.2
Note: The manufacturer's guaranteed properties: Impact Value: 40 J at -20 °C						
FabCO 308L-T1	AWS A5.22	E308LT1-4	75-80%Ar+CO2	ALL	DCEP	Ø1.2
FabCO 309L-T1	AWS A5.22	E309LT1-4	75-80%Ar+CO2	ALL	DCEP	Ø1.2
FabCO 316L-T1	AWS A5.22	E316LT1-4	75-80%Ar+CO2	ALL	DCEP	Ø1.2

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FabCO 308L-T1	AWS A5.22	E308LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6
FabCO 309L-T1	AWS A5.22	E309LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6
FabCO 316L-T1	AWS A5.22	E316LT1-1	100%CO2	ALL	DCEP	Ø1.2, Ø1.6

Note: FabCO 308L-T1 is identical to TFW-308L
 FabCO 309L-T1 is identical to TFW-309L
 FabCO 316L-T1 is identical to TFW-316L

TWE-711	ABS	3YSAH5	100%CO2	ALL, V-DOWN	DCEP	Ø1.2~Ø1.6
TWE-711Ni	ABS	4YSAH10	100%CO2	ALL	DCEP	Ø1.2~Ø1.6


 Fu, Ai-Qing SURVEYOR

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WELDING CONSUMABLE CERTIFICATE

Certificate No.: 650920-3683649-003 _____

Report No.: SQ3683649-A _____

Port of: Shanghai, P.R.China _____

Date: 26 August 2019 _____

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR PLANT AT SUZHOU, P.R.CHINA, ON THE 06TH DAY OF JUNE, 2019 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE ANNUAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE GAS METAL ARC WELDING INCLUDING MIG/TIG WELDING SECTION:

<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TGS-2209	AWS A5.9	ER2209	100%Ar	ALL	DCEN	Ø1.6~Ø2.4
TM-56	ABS	3YSA	100%CO2	ALL	DCEP	Ø0.8~Ø1.6
TGS-308L	AWS A5.9	ER308L	100%Ar	ALL	DCEN	Ø1.2~Ø3.2
TGS-309L	AWS A5.9	ER309L	100%Ar	ALL	DCEN	Ø1.2~Ø3.2
TIG-50	ABS	3YSA	100%Ar	ALL	DCEN	Ø1.2~Ø3.2
TGS-316L	AWS A5.9	ER316L	100%Ar	ALL	DCEN	Ø1.6~Ø3.2
Note: The manufacturer's guaranteed properties: Impact Value: Min. 60 J at -196 °C						
TGS-308L	AWS A5.9	ER308L	100%Ar	ALL	DCEN	Ø1.6~Ø2.4
Note: The manufacturer's guaranteed properties: Impact Value: Min. 31 J at -196 °C						


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Port of: Shanghai, P.R.China_____

Date: 26 August 2019_____

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THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF TIEN TAI ELECTRODE (KUNSHAN) CO., LTD., ATTEND THEIR PLANT AT SUZHOU, P.R.CHINA, ON THE 06TH DAY OF JUNE, 2019 AND ON SUBSEQUENT DATES, IN ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES AND TO WITNESS AND REPORT ON THE ANNUAL APPROVAL TESTING OF WELDING CONSUMABLES; AND,

THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SUBMERGED ARC WELDING SECTION:

TRADE NAME	SPECIFICATION	GRADE OR CLASS	SHIELDING GAS	POSITION	CURRENT/ POLARITY	SIZE
TW-309L/TFS-300NB	AWS A5.9M	ER309L	--	F	DCEP	Ø3.2~Ø4.0

WIRE TW-309L TO BE USED TOGETHER WITH FLUX TFS-300NB MANUFACTURED BY TIEN TAI ELECTRODE (KUNSHAN) CO., LTD.

TSW-12KHG/TF-210	ABS	5Y40TMH5	--	F	DCEP	Ø2.4~Ø5.0
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WIRE TSW-12KHG TO BE USED TOGETHER WITH FLUX TF-210 MANUFACTURED BY TIEN TAI ELECTRODE (KUNSHAN) CO., LTD.

TSW-12KHG*2/TF-210	--	--	--	F	DCEP	Ø2.4~Ø5.0
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MANUFACTURER'S GUARANTEED PROPERTIES: CHEMICAL COMPOSITION (%): C: 0.06-0.10; Si: MAX. 0.10; Mn: 1.6~1.9; P: MAX.0.02; S: MAX.0.01; Cu: MAX.0.1.

MECHANICAL PROPERTIES: YIELD STRENGTH: MIN.: 400 N/MM²;

TENSILE STRENGTH: 510~690 N/MM²; ELONGATION: MIN.: 22%; IMPACT: MIN.: 47J AT -60°C

WIRE TSW-12KHG TO BE USED TOGETHER WITH FLUX TF-210 MANUFACTURED BY TIEN TAI ELECTRODE (KUNSHAN) CO., LTD



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THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SUBMERGED ARC WELDING SECTION:

<u>TRADE NAME</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TSW-14H/TF-560	ABS	4Y400TMH5	--	F	AC/DCEP	Ø2.4-Ø5.0
WIRE: TSW-14H TO BE USED TOGETHER WITH FLUX: TF-560 MANUFACTURED BY TIEN TAI ELECTRODE CO., LTD.						
TSW-14H *2/TF-560	ABS	4Y400TMH5	--	F	AC/DCEP	Ø2.4-Ø5.0
WIRE: TSW-14H TO BE USED TOGETHER WITH FLUX: TF-560 MANUFACTURED BY TIEN TAI ELECTRODE CO., LTD.						



Fu, Ai-Qing SURVEYOR

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THAT THE FACILITY OF THE ELECTRODE MANUFACTURER SUPPLYING THE MARKETING COMPANY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT BASED ON CERTIFICATION TESTS WITNESSED BY ABS CONFIRMED AT THIS TIME, AND THAT EACH WELDING CONSUMABLE LISTED BELOW IS CONSIDERED IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE SUBMERGED ARC WELDING SECTION:

<u>BRAND NAME (OEM)</u>	<u>SPECIFICATION</u>	<u>GRADE OR CLASS</u>	<u>SHIELDING GAS</u>	<u>POSITION</u>	<u>CURRENT/ POLARITY</u>	<u>SIZE</u>
TW-308L / TFS-300NB	Manufacturer*	Stainless **	--	F	DCEP	Ø2.0~Ø4.0mm

* Manufacturer's guaranteed minimum properties Y.S. 320 MPa, T.S. 520 MPa, El. 35%, Impact Value Min. 34J@-196 Degree C; Wire composition according to AWS A5.9-12 ER308L.

** Intended for welding of duplex stainless steel for corrosion resistance applications.

Expiry Date: 25 August 2020 or OEM certification expired whichever occurs first


Fu, Ai-Qing SURVEYOR

Note: This Certificate evidences compliance with one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. This Certificate is a representation only that the structure, item of material, equipment, machinery or any other item covered by this Certificate has met one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping as of the date of issue. Parties are advised to review the Rules for the scope and conditions of classification and to review the survey records for a fuller description of any restrictions or limitation on the vessel's service or surveys. The validity, applicability and interpretation of this Certificate is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this Certificate or in any notation made in contemplation of this Certificate shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.



ABS

WELDING CONSUMABLE MANUFACTURER APPROVAL PLANT SURVEY

PID: 4328636__

FILE REF: S-6_____

REPORT NUMBER: SQ3719608-A_____

WCN: 650920_____

PORT: Shanghai, P.R.China_____

DATE: 26 August 2019_____

MANUFACTURER NAME: Tien Tai Electrode (Kunshan) Co., Ltd._____

ADDRESS: No.189, Huayuan Road, Zhangpu Town, Kunshan City, Jiangsu, P. R. China_____

MMdb Contact Information – For sending Annual Endorsement and Renewal email notifications

CLIENT CONTACT: Ms. Yao Kai-Rong_____ EMAIL: kairong.yao@itwweld.com_____

TELEPHONE: 008651250167825_____ EMAIL: kairong.yao@itwweld.com_____

TRADE NAME: AS SHOWN ON ACCOMPANYING CERTIFICATE_____

IMPORTANT ASPECTS OF WELDING CONSUMABLE MANUFACTURING CONTROLS

1. Procedure governing the mixing of raw materials to produce uniform coatings and fluxes:
SATISFACTORY

2. Identification system for the control of in-house material:
SATISFACTORY

3. Procedure governing baking of electrodes, flux-cored wire and fluxes:
SATISFACTORY

4. Concentricity checks of covered electrode coatings:
NA

5. Uniformity and flux fill check of flux cored wire:
NA


6. Diameter check of solid and flux-cored wire:
SATISFACTORY

7. Condition of heating equipment for baking/drying coated electrodes:
NA

8. Acceptance and rejection criteria of defects in coated electrodes:
NA

9. Verification of Charpy V-Notch specimens dimensions (notch angle, radius, squareness and cross-sectional area):
NA

10. Verification of finished products from outside procedures:
NA


Fu, Ai-Qing Surveyor

26 August 2019_____
Date