



VALIDATION OF WELDING EQUIPMENT

Calibration, Verification and Validation is the procedure of demonstrating that the equipment conforms to the operating specification, it is a measure to establish i.e; to what accuracy the equipment is to be validated, and then to apply corrective actions to tune the equipment back to its original factory tolerance window if required.

VERIFICATION ≠ VALIDATION ≠ CALIBRATION

- **Verification** – Very simple checks by internal QAQC/Technician of the fabrication workshop. No skills required.
- **Validation** – Verification of equipment using proper measuring tools to gauge its accuracy to an EN standard.
- **Calibration** – After Validation, if the equipment is inaccurate, further tuning back to manufacturers specifications.

Who Needs It?

- All ISO 9001 companies performing welding would need to validate their equipment.
- Companies having EN ISO 3834 quality requirements.

How It Is Done?

- Load bank provides stable electrical load into the welding machine and a constant weld current output can then be measured and recorded.

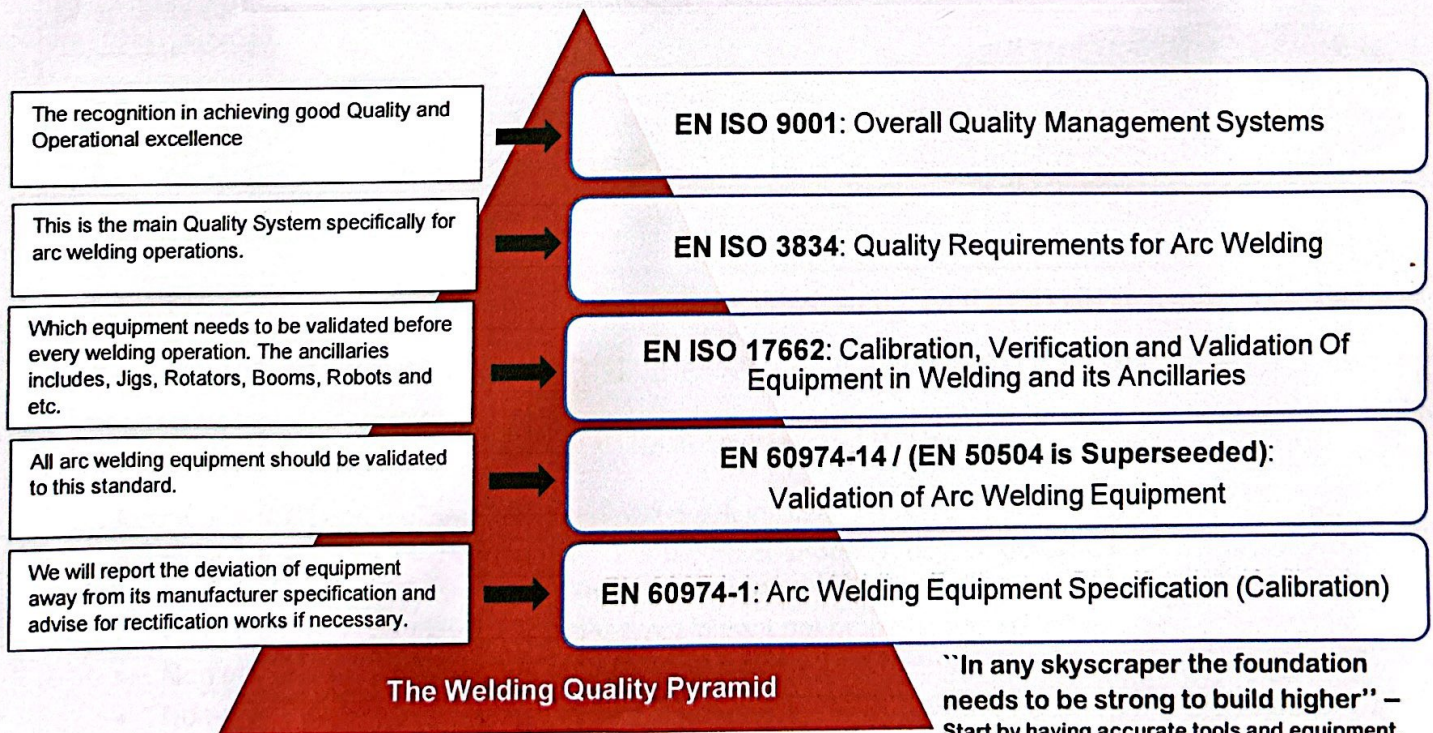
When It Is Needed?

- EN ISO recommends validation to be done. when equipment is repaired and major parts changed, short circuited.
- Validity of certificates is from 6 – 12 months

Why Is It Needed?

- To comply with requirement of Welding Procedures (WPS)
- Reduce defects during welding.
- Prevent workplace accidents.

HOW PROPER VALIDATION CAN IMPROVE QUALITY



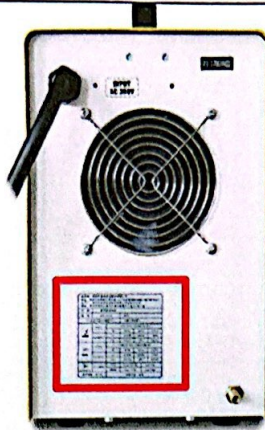
VCS Calibration and Validation Standards Sdn Bhd

No.1, Jalan Utarid U5/13, Section U5, 40150 Shah Alam, Selangor D.E. Tel: +6 012 403 1838; Email: enquiry@vcssb.com







WHY VALIDATION IS CRITICAL !!!



Front view



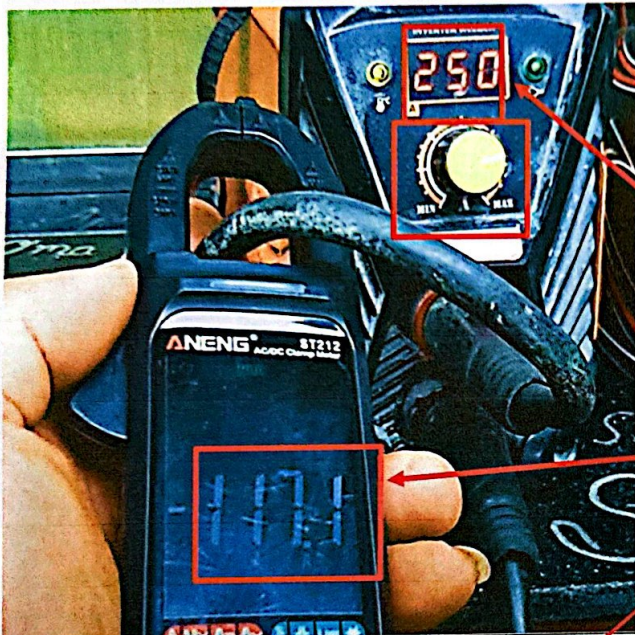
Back sight

(1)3 ~				EN 60 974 - 1						
		40A/22V - 250A/30 V								
		U	V	X	35%	60%	100%			
				I ₂	250 A	200 A	150 A			
				U ₂	30 V	28 V	26 V			
		60								
 (1)3 ~		cos. φ 0.68 (150 A) cos. φ 0.82 (250 A)								
		U ₁	V	 T 35 A T 20 A	I ₁	A	I ₁	A	I ₁	A
					220	43	35.5	27		
					380	25	20.5	15.5		
I. CL.	H	50 Hz	S ₁	16.3 kVA	13.5 kVA	10.3 kVA				
COOLING		AF	JP 21							

Degree of protection

Symbol for protection, Class 2 equipment

Suitable for welding operations in hazardous situations



Validation is necessary to ensure performance of equipment is following what is in the nameplate. As welding machine becomes cheaper, many equipment cheats on performance, hence it is a real issue in critical welding applications.

Machine current maxed out at 250Amps, but measured values is completely different. This weld will be full of defects as it could not work within the parameters of welding consumable.

The recorded value is not consistent due to welding fluctuations. Question is how does the QC Personnel take a single measurement value?

Secondly, large fluctuations of the measured current against pre-set current values, and also big deviations away from WPS range

WELDING LOG SHEET

Pases	Electrode	Process	Amps(A)	Volts(V)	Travel Speed (CM/min)	Heat Input (KJ/mm)
Root	E8045-P2 H4R	2.5	70 - 90	23 - 28	9 - 20	1.7
Hot Pass	E8045-P2 H4R	4.0	200 - 280	25 - 30	25 - 30	1.6
Fill	E8045-P2 H4R	4.0	200 - 280	25 - 30	25 - 30	1.6
Cap	E8045-P2 H4R	4.0	200 - 280	25 - 30	25 - 30	1.6

If welding machine is not correctly validated and calibrated. How can it follow the WPS?

Such a practice of validating the welding equipment is NOT the right way for maintaining the annual validation certificate of the welding equipment !!!

Improperly validated welding equipment will result in:

- Root Cause of welding defect could not be traced properly. (Eg; Undercuts, Lack of Fusions, Slag Inclusions are mainly caused by improper welding parameters which is provided from equipment).
- Risk of electrocution and fire hazard if equipment not properly maintained by qualified personnel.
- Non efficient welding equipment will have higher electricity consumption.
- Non-Conformance risk to the business. If your validation works are not carried out in accordance to the correct standards, final product may end up being rejected.

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THE PROPER WAY SHOULD BE



Equipment can be commissioned for On-site use as well. This will reduce your manufacturing down-time tremendously.

Load bank supplies a stable source of electrical load to the welding machine. A constant value can be recorded.

The resistance of the input and output cables and shunts are also taken into consideration.

welder performance test can number			
input voltage (V) :	415.5	output voltage (V) :	29.8
A phase current (A) :	19.20	output current (A) :	241.9
B phase current (A) :	18.81	output power (kw) :	7.22
C phase current (A) :	19.34	efficiency (%) :	84.6
input current (A) :	19.11		
input power (kw) :	8.50		
power factor (pf) :	0.61		

working time		total time	
5	20	start	stop

Input and Output values can be measured and compared. We are able to measure for both standard accuracy (10%) and Precision accuracy (2.5%)

The efficiency of the welding machine can be measured also.

For any validation to be properly done, it should have the following: -

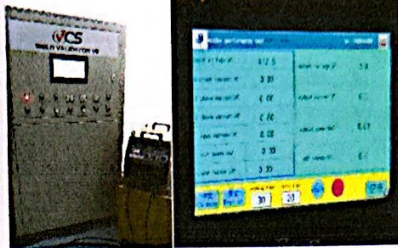
- Qualified personnel who is competent to perform the job
- Load Bank and Measuring equipment which are calibrated to national standards
- VCS being an independent body 3rd party service provider.
- Certificate and Equipment tag conforming to correct standards.

VCS Calibration and Validation Standards Sdn Bhd

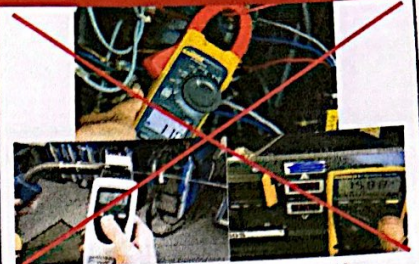
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What is the Difference?

'Nearly all of the welding machines in the market are not properly validated according to specifications!!!'



The correct way!!!



Common Industry Practice

Measurement Equipment	The VCS way!	Tong Tester and Voltmeter
Measurement Equipment	Weld Validation Kit	Tong Tester / Voltmeter
Is the measurement reliable for welding?	Yes	No
Does it consider the resistivity of cables, shunt, etc?	Yes (Measured from equipment internals)	No (Dependent on where you measure)
Measurement consistency?	Yes (RMS/Mean Value is considered)	No
Does it consider your input/main power supply?	Yes (Voltage Regulator to harmonise input)	No
Is a load resistor equipment used during validation?	Yes (Able to measure >10mins on max load)	No
Personnel		
Results are reviewed with qualified personnel?	Yes (Reviewed by EN ISO 14731 personnel)	No
Certificates and Validation Tag issued?	Yes (Certificates and Tag issued by TWI)	No
Certificate Conformances - Validation	Yes (EN 60974-14 / EN 50504)	No
Is the Calibration/Validation standards traceable?	Yes (TWI is a globally recognized Institute)	Yes (reliant on the internal QAQC)
QR Code Traceable Certificates	Yes (QR Accessible to everyone)	No (Manual filing on reports in hardcopy)
Deliverables		
Validation Certificate (EN ISO 60974-14)	Yes (Upon satisfactory results)	No
Validation Tag with Easy Traceability	Yes (QR Traceable, accessible to everyone)	No

Validation And Calibration Standards Sdn. Bhd.
 No. 1, Jalan Likiep UT/13, Section 13, Teluk Anson, 01100 Teluk Anson, Selangor
 +6012 228 5939 | info@vcsstandards.com

VALIDATION CERTIFICATE

For arc welding machine equipment according to IEC 60974-34

Customer Name: sample
 Customer Address: sample

Equipment: TIG Power Source
 Brand: Heco Tech
 Model: TP-4000V
 Serial Number: 115174
 OCV: 85V

Certificate Number: VT-001-23
 Date: 19/12/2022

Highest set values for current (static): 400A

Highest set values for voltage (static): 281V

☒ TIG (CC) $I_2 = (10 + 0.04 \times I_1) \text{ V}$
☒ MMA (C/C) $I_2 = (20 + 0.04 \times I_1) \text{ V}$

Validation grade:

☒ Standard

☒ Precision

Measured Voltage: 281.3 Phase

Temperature:

No.	Specification	Setpoint	Measured	Diff. to setpoint	Current reference value min reference value (A)	Difference to setpoint (V)	Acceptable error - (V)	Test value within tolerance
1	10% 400A	40	0.28	(0)	41	1	4	👍
2	20% 400A	80	0.17	(0)	79.4	-0.6	4	👍
3	30% 400A	120	0.12	(0)	120.5	0.5	4	👍
4	40% 400A	160	0.10	(0)	161	1	4.03	👍
5	50% 400A	200	0.08	(0)	200.9	-0.1	8	👍
6	60% 400A	240	0.07	(0)	239.1	-0.1	8	👍
7	100% 400A	400A	0.07	(0)	400	0	10	👍

Test Result: Pass Fail

Date of verification: 19/12/2022

Remarks:

By: Nur Shafiqah
 Quality Control Manager

Name: N.K.A. Keong
 Designation: Designer

RECEIVED TWI CALIBRATION
 19/12/2022

23 DEC 2022

MOHD ZUOI MOHD DALIM
 QUALITY PROGRAM MANAGER

Name: Mohd Muzoi Mohd Dalim
 Designation: Quality Program Manager

Date: 19/12/2022

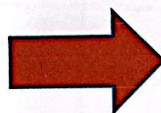
Date: 19/12/2022

TW1 Technology Sdn. Bhd. 45A, Jalan Gopichandran
 Date: 19/12/2022

Reference instruments validation information

Reference Instruments	Serial No.	Certificate No.	Calibration Date	Due Date
Juke Current Clamp Meter 1010	810020463	MET 5009/1222	19/12/2022	19/12/2023
Portable Insulation Tester 3165	MIEM009972	MET 5009/1222	17/12/2022	17/12/2023
Juke Scope Meter 1238	41800142	MET 5009/1222	01/12/2022	01/12/2023

Easy traceability



**Scan QR Code
on Tag to
retrieve cert**

With TWI and
Qualified Welding
Engineer
Endorsement

CS **TWI**

VALIDATION

(3rd Party Endorsement)

CERT. NUMBER: VT-001-23

EFFECTIVE DATE: 15/12/2022-19/12/2023

EQUIPMENT SERIAL NO.: 118822018

CONFORMANCE: EN ISO 60974-14:2018

Scan for report

VI-001-23

Scan me with your phone now!!!!



VALIDATION CERTIFICATE

For arc welding machine equipment according to IEC 60974-14

Customer Name: sample
Customer Address: sample

Equipment: TIG Power Source
Brand: Hero Tech
Model: TP-4000
Serial Number: 118822018
OCV: 65V

Certificate Number: VT-001-23

Date: 19/12/2022

Highest set values for current (rating plate): 400A

Highest set values for voltage (rating plate): 26V

☒ TIG (CC) $U_2 = (10 + 0,04 * I_2) V$
☐ MMA (CC) $U_2 = (20 + 0,04 * I_2) V$

Validation grade:

☐ Standard Measured Voltage: 415V, 3 Phase
☒ Precision Temperature: 30°C

No.	Specifications			Setting load resistance acc. standard (Ω)	Corresp. to switch position	Display reference meas. instr. reference value (A)	Difference to set setpoint (A)	Admissible error ± (A)	Test value within tolerance
	X % of highest set value	Setpoint to be set	Set setpoint (A)						
1	10% 400A	40A	40	0.29		41	1	4	✓
2	20% 400A	80A	80	0.17		79.4	-0.6	4	✓
3	30% 400A	120A	120	0.12		120.6	0.6	4	✓
4	40% 400A	160A	160	0.10		161	1	4.03	✓
5	60% 400A	240A	240	0.08		239.9	-0.1	6	✓
6	80% 400A	320A	320	0.07		320.1	0.1	8	✓
7	100% 400A	400A	400	0.07		400	0	10	✓

Test Result: Pass ☒ Fail ☐

Date of expiry of verification: 19/12/2023

Remarks:

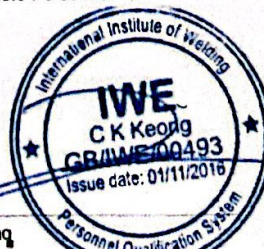
Reviewed Personnel



Name: Hoo Shin Yen
Designations: Technical Manager

Date: 16/12/2022

Responsible Personnel



Name: Cheah Kok Keong
Designations: ISO14731 Qualified Welding Engineer

Date: 19/12/2022

Reviewed Personnel (2nd Party Endorsement)
TWI TECHNOLOGY (S.E.ASIA)
SDN. BHD.

23 DEC 2022

MOHD MARZUQI MOHD DALIM
WELDING PROGRAM MANAGER

Name: Mohd Marzuqi Mohd Dalim
Designations: Welding Program Manager
TWI Technology (S. E. ASIA) Sdn Bhd
Date: 19/12/2022

Reference instruments validation information

Name	Serial No	Certificate No	Calibration Date	Due Date
Weld Validator V5	LB0161	MET5607/1222	28/12/2022	28/12/2024
Fluke Current Clamp Meter i1010	60230683	MET 5089/1222	9/12/2022	9/12/2023
Kyoritsu Insulation Tester 3165	W8200972	MET 5090/1222	7/12/2022	7/12/2023
Fluke Scope Meter 123B	41800142	MET 5091/1222	9/12/2022	9/12/2023
Weld Validator V8	LB0121	MET5606/1222	28/12/2022	28/12/2024



永達機械有限公司

Wintex Engineering & Machinery Sdn. Bhd. 435547-D

No. 23, Jalan Dato, 30000 Ipoh, Perak.

Tel : 05-2540560 (Hunting Line), 2545607, 2534210, 2540632, 2534142, 2411781

Hp : 012-305 3173, 012-507 3322 , 012-578 2433

Email : wintex22@hotmail.com

Website : wintexengineering.com

Validation Charges (Per Unit)

No	HPT	New	Old
1	ST-162	F.O.C	RM400.00
2	ST-402	F.O.C	RM500.00
3	ST-502	F.O.C	RM500.00
4	TP-208	F.O.C	RM400.00
5	TP-250	F.O.C	RM400.00
6	TAD-300	F.O.C	RM400.00
7	TAD-400	F.O.C	RM500.00
8	TAD-500	F.O.C	RM500.00
9	IM-4000EF	F.O.C	RM650.00
10	IM-5000EF	F.O.C	RM650.00
11	IM-6500EF	F.O.C	RM650.00
12	IM-8000EF	F.O.C	RM650.00

No	HPT	New	Old
1	GM-2000	RM300.00	RM400.00
2	GM-2200	RM300.00	RM400.00
3	TP-2000P	RM300.00	RM400.00
4	GM-3800	F.O.C	RM400.00
5	GM-4200	F.O.C	RM500.00
6	GM-5000	F.O.C	RM500.00
7	TP-2800P	F.O.C	RM400.00
8	TIG-4000	F.O.C	RM500.00
9	TP-4000	F.O.C	RM500.00
10			
11			
12			

	Validation Charges (Per Unit)	
Amps	MMA / TIG	MIG / SAW / Multi Process
Below 300	RM400.00	RM450.00
300 - 500	RM500.00	RM650.00
Above 600	RM1,400.00	RM1,400.00

***Replacement of Validation Tag : RM60.00**

Zone	State	On-Site Service Charges (Per Trip)
Zone A	Penang, Pahang, Johor	RM600.00
Zone B	Kedah, Perlis, Kelantan, Terengganu	RM900.00
Zone C	Perak, Melaka	RM450.00
Zone D	Selangor, Negeri Sembilan	RM150.00