INTER PLANT STANDARD - STEEL INDUSTRY		
IPSS	SPECIFICATION FOR THYRISTORIZED ARC WELDING TRANSFORMER-RECTIFIER SET Corresponding IS does not exist	IPSS:1-07-062-95

0. FOREWORD

0.1 This Inter Plant Standard prepared by the Standards Committee on Paints and Portable Maintenance Equipment, IPSS 1:7 with the active participation of the representatives of all the steel plants and established manufacturers of Thyristorized Arc Welding Rectifier Sets and was adopted in January 1995.

0.2 This standard supersedes IPSS:1-07-002-88 Specification for arc welding rectifier set *(second revision)*'

1. SCOPE

1.1 This Inter Plant Standard covers the requirements of portable single operator type fully thyristorized arc welding transformer-rectifier set used for metal arc welding and arc gauging.

2. SITE CONDITIONS

2.1 Site conditions shall be as given in IPSS:1-02-020-84 'Basic Parameters for selection of steel plant equipment'.

2.2 For special applications where steam and corrosive fumes are present, details shall be as agreed to between the manufacturer and the purchaser.

3. REQUIREMENTS

3.1 General

3.1.1 The minimum ground clearance (clearance between lowest part of the enclosure of the set and ground) shall be 150 mm.

3.1.2 The set shall be mounted on solid tyred wheels, front wheel(s) swivelling and steered by a drawbar. Suitable lifting arrangement shall be provided to facilitate lifting of the complete set with a provision to lock the drawbar while the set is being lifted and transported by EOT crane.

3.1.3 The set shall be so designed that when transported on mobile equipment, it shall not suffer internal or external damage due to vibrations, it is exposed to, in such transportation.

3.1.4 The solid wheels shall be constructed with UHMWPE (Ultra-High Molecular Weight Polyethylene) having 254 mm OD x 50 mm Width x 25 mm Bore and shall have the following properties:

Hardness : 70 - 80 Shore-D	ASTM D 785
Heat Deflection temperature : 100°C (AT 4.5 KG/CM^2)	ASTM D 648
Tensile Strength : 500 kg/cm^2	ASTM D 638
Abrasion Loss : 3 x 10^{-3} cm^3/100 revolutions on Tabor abrasion Wheel	DIN 53754

3.1.5 The set shall be single operator type.

3.1.6 The set shall be fan cooled with metallic blades having low noise and shall be provided with single phase 240 V ac motor.

3.2 **Technical**

3.2.1 The rating of the set shall be as given below:

Maximum Continuous Welding Current in Amps	Duty Cycle (percent)	Cycle Time (in minutes)
400 Amps	60	5
600 Amps	60	5

3.2.2 The set shall be capable of operating on a supply voltage of 415 ± 6%, 3 phase, 50 Hz ± 3% ac. Protection against overloading and single phasing shall be provided for the set.

3.2.3 The set shall have Solid State thyristorized control.

3.2.4 The internal windings and wiring upto the terminals of the transformer shall be with 100% electrolytic copper.

3.2.4.1 All control cables shall be of multi strand construction and shall be properly identified by interlocked ferrules.

3.2.5 The set shall be with minimum class H insulation.

3.2.6 There shall be provision to change the current setting while in operation. The set shall have remote control facility, if specially asked for.

In case of remote control, the remote control cable shall be of copper and must have a protection such that if the current control short circuits with the job or holder cables, the PCB shall be protected electronically, to avoid failure of PCB. Remote control cable shall be of 2 core.

3.2.7 The output current shall be stabilized against input voltage fluctuations.

3.2.8 Provisions shall be there to measure output current and voltage.

3.2.9 The open circuit voltage of the set shall have 80-100 Volts for manual metal arc welding and metal arc gauging. The manufacturer shall specify on the name plate, the welding current at 100% duty cycle in addition to that of 60%. The 600 Amp machines should also be suitable for air arc gauging purpose and the set shall be provided with suitable semi constant potential characteristic.

3.2.10 All the terminals provided in the set shall be suitable for connection to aluminium conductor cables of appropriate size. The terminals for the incoming and outgoing leads shall be made of copper flats of sufficient thickness with a suitable drilled hole suitable for connection to cable terminal ends of appropriate sizes.

3.2.10.1 The terminal boards shall be made of non-hygroscopic insulating board of P 3 grade as per IS 2036:1974 'Phenolic laminated sheets' with malamine overlay for anti-tracking or its equivalent grade P 120 MO of Backelite Hylam or EP 3 MO of formica.

3.2.11 The control voltage shall be isolated from main rectifier power supply.

3.2.12 Failure of cooling fan shall automatically make the set inoperative.

3.2.13 The set shall be protected against accidental short circuit of the output cable.

3.2.14 The output current of the set shall remain constant during welding irrespective of increase or decrease in the arc length.

3.2.15 A switch fuse unit of suitable rating shall be provided with isolator, contactors and energy saver on the incoming lines and mounted on the set.

3.2.16 The thyristors shall preferably be in the secondary side of transformer. The minimum output ripple frequency should be 300 Hz for smooth arc.

3.2.17 Three semi-conductor fuses shall be provided in the supply line, on the primary side of the transformer.

3.2.18 The regulation of the set current shall be achieved within $\pm$ 2%.

3.2.19 Surge suppression network shall be provided to protect both the power and control rectifiers.

3.2.20 The set shall be provided with Hot Start and Anti-Freeze facility and is explained below:

Hot Start & Anti-Freezing - Extra current injection to enable easy arc striking, every time the arc is struck. Welding starts with deep penetration. The porosity developed by previous arcing is eliminated by this extra current injection. Poor shielding due to elongation of arc can also be eliminated by this.

3.2.21 A programme switch shall be provided to switch on from MMAW to TIG welding to cut off extra current injecting to weld thin sheets like expansion joints, bellow joints etc.

4. INFORMATION TO BE FURNISHED BY THE SUPPLIER

4.1 The supplier shall supply the following with each set:

a) illustrative catalogue with detailed description for the operation and maintenance of the set,

b) recommended list of spares,

c) Schematic sketch showing the power and control circuit connections,

d) PCB circuit with check points,

e) Trouble-shooting chart, and

f) Type test report.

NOTE: Maximum continuous hand welding current shall be 400 A corresponding to an open circuit voltage of 80 V at 60% duty cycle with a 5 minute cycle time. The minimum rating at 60% duty cycle for both 400 & 600 A (for users' guidance only) at various temperatures shall be as follows:

	40°C	45°C	50°C
For 400 A machines	400	375	350
For 600 A machines	600	565	530