PLOT NO. 1131 HARI ENCLAVE KIRARI SLEMAN NAGAR NEW DELHI-110086
2ND PLANT H-936 RIICO CHOPANKI INDUSTRIAL AREA ALWAR RAJSTHAN-301707

RESOTECH Charpy /Izod Testing Proposal

Professional Manufacturer of Test Equipment

RESONANCE AUTOMATION AND MACHINES

MANUFACTURERS & SUPPLERS

SPECIAL PURPOSE MACHINE, MATERIAL TESTING MACHINE, LEAKAGE TESTING MACHINE, PACKIGING TESTING MACHINE, ENVIRONMENTAL TEST CHAMBER, ASSY. LINE EQUIPMENT, SOLUTION FOR ELECTRONIC AUTOMATION AND PRODUCT DEVELOPMENT, COMPUTERIZED CONTROL MACHINE , PLC HMI SCADA VISUAL BASIC SOFTWARE DEVELOPMENT SOLUTION AND OTHER SERVICES.

INTRODUCTION

Our offered machine is widely used to determine the anti-impact capability of metal materials under dynamic load. This machine is manufactured using the best quality raw material and latest technology as per the international standards. The offered machine is well known for its corrosion resistant finish, durable construction and longer service life.

- Electronic digital display
- Simple construction of pendulum izod so that izod or charpy machine, machine can build at sight

- Interchangeable stickers for izod & charpy positions
- Positive pendulum lock in izod & charpy positions
- Safety guard for protection
- A braking arrangement for stopping the pendulum

Analogue Impact Testing Machine

Make : Resotech

Model : Charpy resotech 2311

Features :

Capacity : Charpy : 300 Joule, Izod: 170 Joule.
This is low cost Impact testing machine & it is specially designed for engineering colleges.
This Machine conforms to IS 3766-1977, IS 1598-1977, IS 1757-1988,IS 1499-1977 and BS 131 Part I, II, III, IV. standard.
This is simple & maintenance free machine.
New modified Brake drum unit is provided to stop the pendulum Swing instantly after test
Safety guard is provided for operator safety.

Standard Accessories :

Charpy Striker R2 mm - 1No.
Izod Strike R0.75 mm - 1No.
Charpy - Izod support Block - 1No.
Specimen setting Gauges for Charpy & Izod - l Each.
Allen key Set - 1 set.
Instruction Manual - 1 No.

Digital Impact Testing Machine

Make : Resotech

Model : Charpy Resotech 2312

Features :

- Capacity:
  Charpy: 300 Joule,
  Izod:170 Joule
- It conforms to BS EN ISO 148,IS 3766-1977, IS 1598-1977, IS 1757-1988, IS 1499-1977 (for Charpy) & BS 131 Part!, II, III, IV (for lzod) current standard.
- Indirect verification with the help of ERM samples can be carried out.
- Direct inciication of impact energy absorbeci by the specimen on digital display unit. (Analogue dial is optional.)
- New modified Brake drum unit is provided to stop the pendulum swing instantly after test.
- Safety guard is provided for operator safety.

Standard Accessories :

- Charpy Striker R 2 mm - 1 No
- Izod Strike R 0.75 mm - 1 No.
- Charpy - Izod support Block - 1 No.
- Specimen setting Gauges for Charpy & Izod - 1 Each.
- Allen key Set - 1 set.
- Instruction Manual - 1 No.

TECHNICAL SPECIFICATION

Model No. : Resotech Charpy 2312	Charpy Test	Izod Tezst
Pendulum Drop Angle Approx	140^{0}C	85^{0}C
Pendulum Effective Weight Approx.	20.59kgs	21.79kgs
Pendulum Speed Approx.	5.3465m/sec	3.857m/sec
Pendulum Impact Energy Approx.	30kgM(300J)	16.4kgM(164J)
Min. graduation approx.	0.2 kgM(2 J)	0.2 kgM (2 J)
Approx. Distance of axis of hammer rotation and centre of test piece/point of test piece hit by hammer	825mm	825mm
Display : Digital Display		

Digital ASTM Charpy Impact Testing Machine

Make : Resotech

Model : Charpy resotech 2313

Features :I963.

Capacity: Charpy: 300 / 400 Joule. Suitable only for Charpy tests on various material. Machine conforms to ASTM-E-23- current standard.

- Optional R2mm striker can be provided as per BS EN IS0148 standard.
- Pendulum release lever with safety lock for operator safety.
- New modified Brake drum unit is provided to stop the pendulum swing instantly after test.
- Large safety guards are provided either side of machine.
- Approval of Impact machine with Charpy test samples from NIST. USA. (optional ERM samples) can be arranged.
- Digital display unit or Analogue large dial for indication of absorbed energy.
- Total Maintenance free machine.
- Optional Motorized with higher capacity impact machine is also available.

Standard Accessories :

- Charpy Striker R8 mm - 1 No.
- Charpy support Block - 1 set.
- Specimen setting Gauge (for Charpy) - 1 No.
- Allen keys - 1 set.
- Foundation Bracket & with tightening bolts - 1 No.
- Instruction Manual - 1 No.

Motorized Impact Testing Machine

Standard Accessories :

Charpy Striker R2 mm - 1 No.
Izod Strike R0.75 mm - 1 No.
Charpy Striker R8 mm - 1 No(Optional)
Charpy - Izod support Block - 1 No.
Specimen setting Gauges for Charpy & Izod - 1 Each.
Allen key Set & tools - 1 set.
Foundation Bracket - 1No.
Model : FIT-300/400-MA/MD
Instruction Manual - 1No.

Make : Resotech

Model : Charpy resotech 2314

Features :

- Capacity: Charpy: 300 / 400 Joule.
- Lifting operation of pendulum Hammer is motorized. Hence there is no strain & fatigue to operator while lifting the pendulum hammer frequently.
- Only one operator can operate the machine easily & rapidly.
- To stop the pendulum swing solenoid Magnetic Brake is provided.
- To prevent accident large safety guard with open able doors & with interlocking system is provided for complete safety.
- Transparent acrylic glass sheet is fitted to safety guard.
- Machine conforms to ASTM-E 23, BSEN ISO 148 & IS standards (for IZOD & CHarpy scales).
- Total Maintenance free Impact Machine.
- Note : Higher capacity 600,750 Joules impact machine are also available.
- MA - Motorised Anologue Dial , MD - Motorised Digital Display

Double Stand ASTM Impact Testing Machine

Make : Resotech

Model : CHARPY RESOTECH-2315

Features

- Machine is suitable for Charpy test.
- Strictly conforms to ASTM E-23 & BSEN 10045-2 current standard.
- Works on pendulum principle. "Difference between height of drop of pendulum before Rupture & height of rise after Rupture of specimen is directly prop otional to impact energy absorbed".
- Direct indication of impact energy absorbed by specimen on digital/computerized unit & on analogue scale.
- Brake & pendulum hammer latching mechanism is provided with the machine.
- Large safety guard is provided to the machine.
- Machine is rigid in construction & user friendly.
- After sales we provide annual calibration, maintence & spares as & when required by the customer.

Combine Impact Testing Machine

Make : Resotech

Model : Charpy resotech 2316

Features :

- Capacity: Charpy : 300 Joule, Izod: 170 Joule.
- Main feature of this machine is, it conform to all respective standards.
  (i.e.Charpy / Izod ASTM E-23, BS 131 & BSEN ISO -148 & IS 3766- 1977, IS 1598-1977, IS 1757-1988, IS 1499- standard).
  (User need not to buy a separate machine for each standard.)
- For Indirect verification NIST/ ERM Charpy samples can be arranged.
- According to test, user can select Charpy strikers(Radius R 2 mm or R8 mm) or Izod strikers (Radius R 0.75 mm).

- To prevent accident from pendulum swing, safety guards are provided to either side of machine.
- Latch Lock is provided for pendulum latch mechanism for safety.
- New modified Brake drum unit is provided to stop the pendulum swing instantly after test.
- Optional Digital display unit can also be supplied.
- Total Maintenance free machine

PStandard Accessories :

Charpy Striker radius R 2 mm, R 8 mm each - 1 No.

- Izod Strike R 0.75 mm - 1 No.
- Charpy - Izod support Block - 1 No.
- Specimen setting Gauges for Charpy & Izod - 1 Each.
- Allen key Set - 1 set.
- Instruction Manual - 1 No.
- Foundation bracket - 1 No

Motorized Broaching Machine

Make : Resotech
Model : Charpy resotech 2317

Motorised Broaching Machine for Making 'V' & 'U' Notch on Impact Specimen

FTM make Motorised broaching machine is suitable for making accurate 'V' and V' Notch in the 10 x 10 mm Impact specimen.
The Broaching machine is fitted with 2 mm 'V' notch broach made from HSS material. Simply by pressing one button one can make 'V' or 'U' notch on Impact specimen.

ADDITIONAL ACCESSORIES

Dry Ice Making Unit

Lateral Expansion Gauge

SUB ZERO TEMPRATURE BATH WITH TEMP INDPICATOR AND SELF CENTERING TONG

Feature :

- Self centering tong for Charpy test as per ASTM- E-23 standard. (Useful particularly for carrying out tests at sub zeI8ro temp.) Moterised Broaching
- Gauge for checking distance of specimen notch from both ends for Charpy and Izod test specimen (One gauge for Charpy and one gauge for Izod). Machine
- Specimen clamp for Izod specimen.
- Gauge for checking std. 'U' notch on specimen.
- Gauge for checking std. 'V notch on specimen.
- Gauge for checking Depth below the std. 'U' notch on specimen.
- Gauge for checking Depth below the std. 'V' notch on specimen. ItOTOPISED BROACHING MACHINE
- GO -NO GO, Gauges for specimens confirming following parameters within specified limits.

1. Centre line of notch from both ends.
2. Angle line of notch from both ends.
3. Depth below standard V notch.

- Template for checking cross section of 10 x 10 mm for Izod / Charpy square test specimen.
- 'U' notch milling cutter.
- 'V' notch milling cutter.
- Motorized Broaching Machine.
- Sub zero Temperature bath .(with digital calibrated temperature indicator & self centering tong).
- Dry ice making unit by using Co2 gas.
- Lateral expansion gauge as per ASTM E-23
- Profile projector with templates suitable for checking root radius of 'V' & 'U' Notch of Charpy / Izod test samples.
- 'U' notch Broaching cutter.
- 'V' notch Broaching cutter.

TYPES OF TEST SPECIMENS

It was impossible to make the standard-size Charpy V-notch impact test specimens whose thickness is 10mm because the thickness of targeted steel plates is 9mm. Therefore, under- sized Charpy impact V-notch test specimens whosethickness is7.5mm were made in this study. In the case of making test specimens by welding, the influence of welding on the change in the material properties like the heat-affected zoneshould be considered. Moreover, some previous studies (Seoet al. 1982; Seo et al. 1983) pointed out that Charpy absorbed energy is effected by restriction by EBW and the adequate test results can not be gained if the distance between each EBW is small. Therefore, test specimens were set with focusing on the width of small steel pieces "*B*" in Figure 5. "*B*" corresponds to the distance of the center of each EBW as shownin Figure 5. Table 3 shows types of test specimens and the values of "*B*". In Table 3, thetest specimen "B-0" indicates the test specimens without EBW. According to the experience of EBW until now, it is supposed that the width of the heat-affected zone byEBW whose welding condition is almost the sameas that in this study may be 6mm. Thewidth of thenon heat-affected zone of each test specimens issupposed to be (*B*-6)mmas shown in Figure 5.

Judging from this assumption about the width of the heat-affectedzone

by EBW, it is estimated thatall over the V-notch area of test specimens "B-4" may become the heat-affected zone by EBW.

Results of Charpy V-notch impact tests

Charpy V-notch impact tests were conducted with under-sized test specimens whose thickness is 7.5mm. The temperature for the Charpy V-notch impact tests was 0°C, -30°C and - 60°C. Figure 8 shows the results of the Charpy V-notch impact tests. The significant difference in the test results at -60°C and -30°C among all test specimensis not found and the values of the Charpy absorbed energy at -60°C and -30°C are verysmall as a whole. On the other hand, the difference in the Charpy absorbed energy at 0°Ccan be found depending on the type of the test specimens. The Charpy absorbed energyof the test specimens "B-13" whose "*B*" is 13mm is almost the same as that of the test specimens "B-0" that is test specimens without EBW although the variation in test results can be seen. The Charpy absorbed energy of the test specimens "B-4" in whichall over the V-notch area is a heat-affected zone is the smallest of all types of test specimens. The Charpy absorbed energy of the test specimens "B-9" whose "*B*" is 9mmexist between that of "B-4" and that of "B-0" or "B-13". The test results show that the Charpy absorbed energy depends on the width "*B*" and the wider "*B*" leads the higher Charpy absorbed energy. Furthermore, the Charpy absorbed energy of the test specimens "B-13" whose "*B*" is 13mm is almost same as that of test specimens withoutEBW. Therefore, it is thought that the Charpy absorbed energy of test specimens madeby EBW may converge to that of test specimens without EBW when "*B*" is almost 13mm. This fact indicates the possibility that the Charpy absorbed energy can be evaluated adequately with the test specimens made with stop-hole-size cores by EBW.

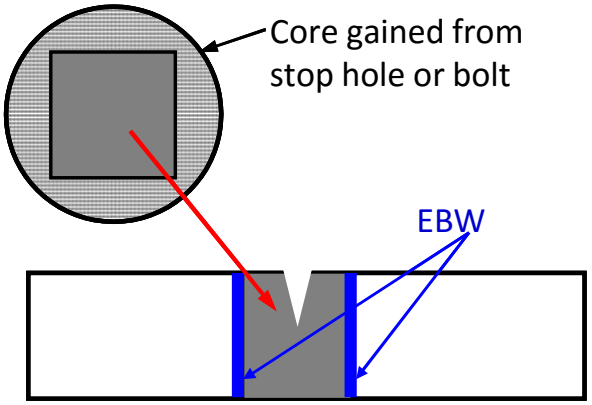


Figure 1 Image of test specimens made with stop-hole-size cores

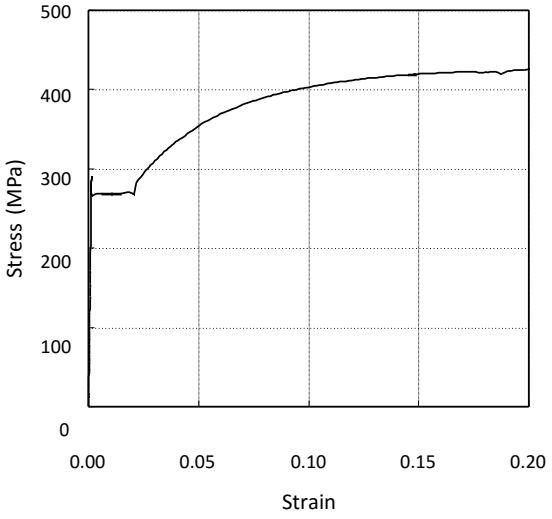


Figure 2 Stress-Strain relationship

Table 1 Mechanical properties

	Direction	Upper yield Stress σ_{yu} (MPa)	Lower yield Stress σ_{yl} (MPa)	Tensile Strength σ_B (MPa)	Elongation δ (%)
Targeted steel	Longitudinal	289	265	428	40.7
	Perpendicular	283	262	424	40.3
SS400(JIS-2008)		≧ 245	-	400 ~ 510	≧ 17
SM400A(JIS-2008)		≧ 245	-	400 ~ 510	≧ 18

Table 2 Results of chemical analysis

	C (%)	Si (%)	Mn (%)	P (%)	S (%)
Targeted Steel	0.18	0.01	0.46	0.031	0.038
SS400(JIS-2008)	-	-	-	≦0.050	≦0.050
SM400A(JIS-2008)	≦0.23	-	≧2.5×C	≦0.035	≦0.035

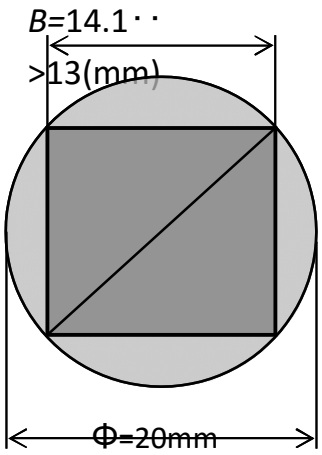


Figure 3 Relationship between assumed and gained steel pieces

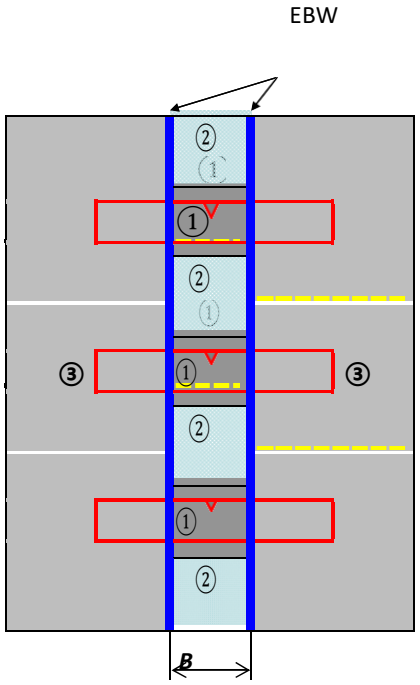


Figure 4 Procedure of making cores test specimens by EBW

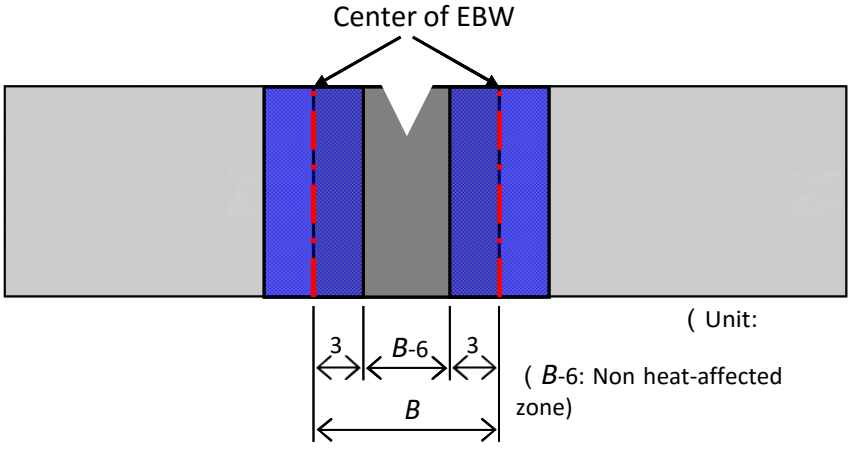
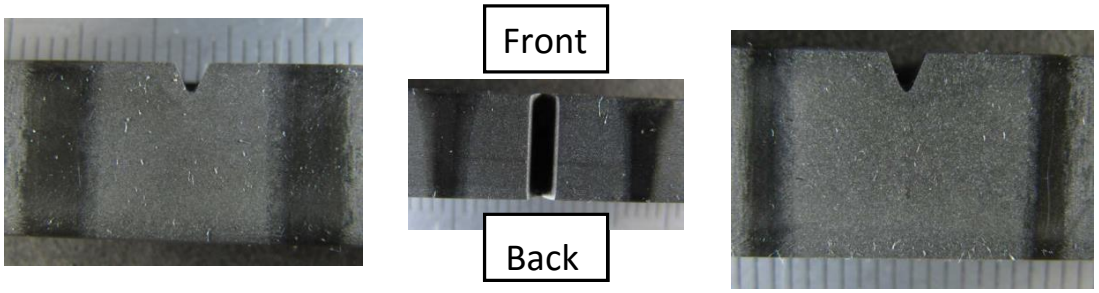


Figure 5 Test specimens made with stop-hole-size cores by EBW

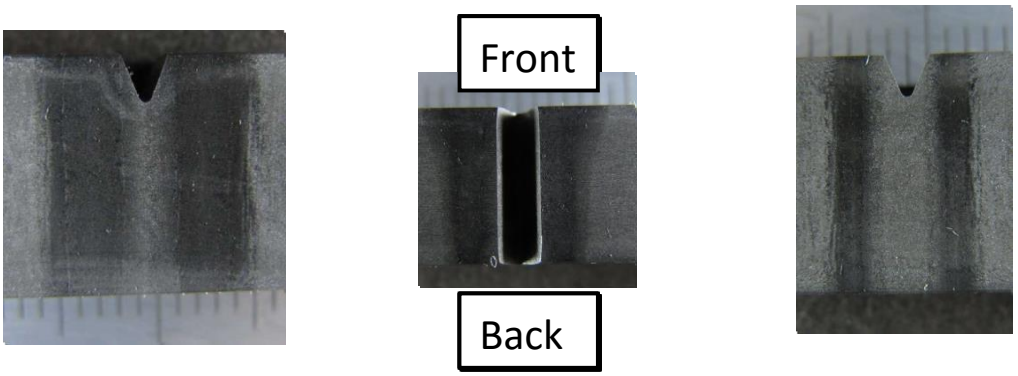
Table 3 Types of test specimens and the values of "*B*", "*B*-6" and "*L*"

	Width of Steel Piece *B* (mm)	Width of Non Heat-affected Zone			
		Assumuption *B*-6 (mm)	Based on Hardness: *L* (mm)		
			Front	Back	Average
B-13	13	7	8	10	9.0
B-9	9	3	3	4	3.5
B-4	4	- (0)	0	2	1.0
B-0	Non-EBW				



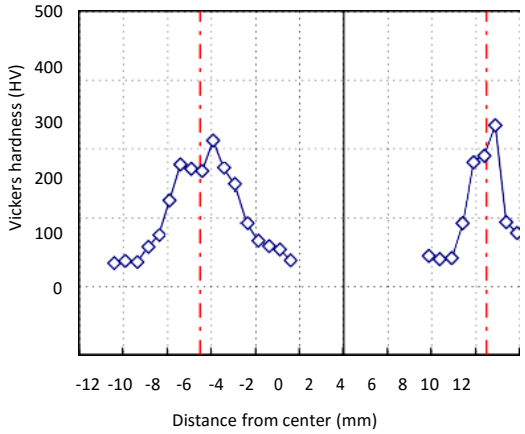
(a) Front surface (b) Side surface (c) Back surface

Picture 1 Results of macrostructure tests of test specimen "B-13"

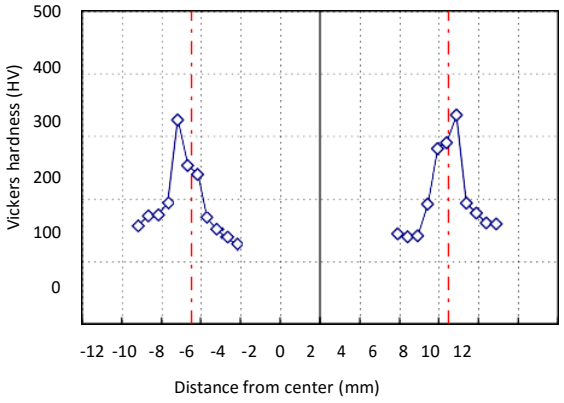


(a) Front surface (b) Side surface (c) Back surface

Picture 2 Results of macrostructure tests of test specimen "B-4"

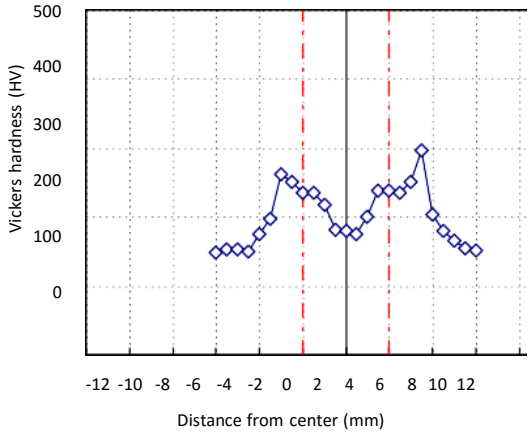


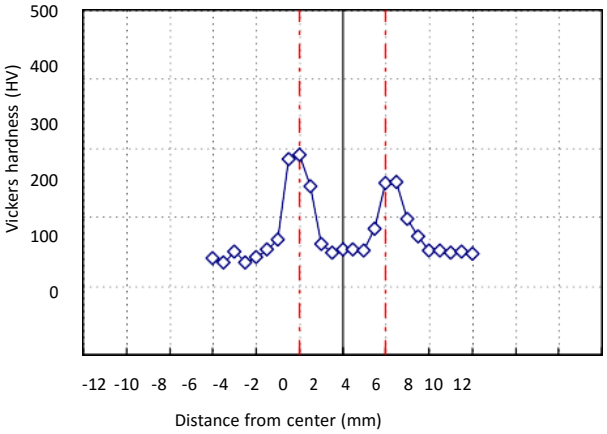
(a) Front surface



(b) Back surface

Figure 6 Results of Vickers hardness tests of test specimen "B-13"





(a) Front surface (b) Back surfaceFigure 7 Results of Vickers hardness tests of test specimen "B-4"

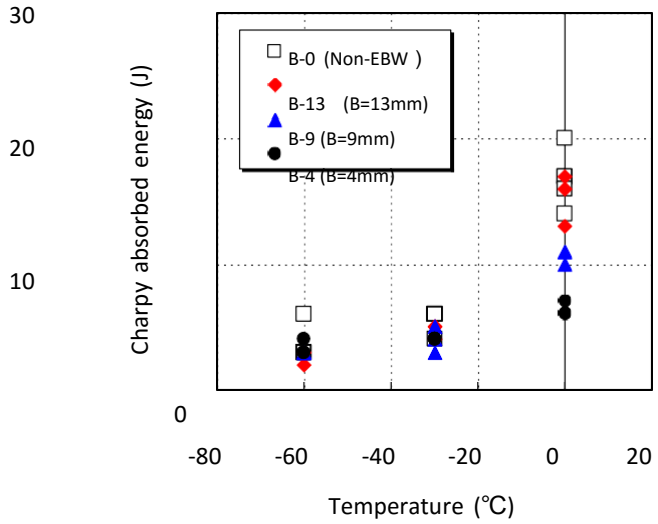


Figure 8 Results of Charpy V-notch impact tests

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KABNUR, ICHALKARANJI - 416 115. Dist. Kolhapur, Maharashtra State, INDIA.
Phone : + 91-230- 2423351 / 2422456 E-mail : anandtest@dataone.in

Certificate No. RC-1009

REFERENCE MATERIAL CERTIFICATE

ATMS-25J-C No. 17

Designation	Steel Charpy V notch reference test pieces (Certified Reference material)
Classification	D5 (according to document ILAC-G12)
Standard	ISO 148 – 3 : 2016 (striker 2 mm)
Measured Mechanical Property	Absorbed energy (KV) (joules) at 20°C
Manufacturer	ANAND TESTING MACHINE SERVICES
Material Code	ATMS-25 J
Batch Number	C
Sample No.	17
Certified Value KV_R (joules)	17.7
Uncertainty (joules)	1.4
Number of degrees of freedom of the certified value, v_{RM}	44
Radius of striker (mm)	2
Temperature (°C)	20
Validity of certificate (if stored in their original packing)	Until MARCH 2023
Metrological Traceability	The certified value and its uncertainty are traceable to the international system of Units (SI) and batches are manufactured in compliance with the requirements of the standard ISO 148-3 : 2016 and the ISO 17034 : 2016 (E) (General requirements for the competence of reference material producer)
Measurement method	Charpy pendulum impact tests in accordance with ISO 148-1 : 2016, using pendulum impact machines with a 2 mm striker tip radius.

The expanded uncertainty of KV_R was calculated with a coverage factor K = 2 corresponding to a level of confidence of about 95 %.

This certificate includes two pages

Date of Issue : 19 FEB 2020

Category : Physical Properties

Sub-category: Impact Toughness

HEAD OF THE LABORATORY,

ULR No. : RC100920000000092F

V. G. Anandache

ANAND TESTING MACHINE SERVICES
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Phone : + 91-230- 2423351 / 2422456 E-mail : anandtest@dataone.in

Certificate No. RC-1009

REFERENCE MATERIAL CERTIFICATE

ATMS-90J-M6 No. 32

Designation	Steel Charpy V notch reference test pieces (Certified Reference material)
Classification	D5 (according to document ILAC-G12)
Standard	ISO 148 – 3 : 2016 (striker 2 mm)
Measured Mechanical Property	Absorbed energy (KV) (joules) at 20°C
Manufacturer	ANAND TESTING MACHINE SERVICES
Material Code	ATMS-90 J
Batch Number	M-6
Sample No	32
Certified Value KV_R (joules)	97.6
Uncertainty (joules)	3.8
Number of degrees of freedom of the certified value, v_{RM}	45
Radius of striker (mm)	2
Temperature (°C)	20
Validity of certificate (if stored in their original packing)	Until MARCH 2023
Metrological Traceability	The certified value and its uncertainty are traceable to the international system of Units (SI) and batches are manufactured in compliance with the requirements of the standard ISO 148-3 : 2016 and the ISO 17034 : 2016 (E) (General requirements for the competence of reference material producer)
Measurement method	Charpy pendulum impact tests in accordance with ISO 148-1 : 2016, using pendulum impact machines with a 2 mm striker tip radius.

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V. G. Anandache

ATMS-25J-C No. 17

DESCRIPTION OF THE MATERIAL

A unit consists of five Charpy V notch reference test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V notch, accurately machined to tolerances imposed in ISO 148-3 : 2016. The five test pieces are packed together in a plastic bag coated with oil to prevent oxidation.

SAFETY INFORMATION

Precautions need to be taken to avoid injury of the operator by broken specimens when operating the Charpy impact pendulum.

INTENDED USE

Sets of five of these certified reference test pieces are indented for the indirect verification of impact testing machines with a striker of 2 mm tip radius, according to the procedures described in detail in ISO 148-2 : 2016. The results obtained, bias and repeatability, are compared with the limit values specified in the standard ISO 148-2 : 2016 (table 2).

STORAGE

Test pieces should be kept at room temperature (25 ± 15°C) in their original packing until used. The ATMS cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

INSTRUCTIONS FOR USE

Special attention is drawn to the cleaning and conditioning of the test pieces prior to testing. It is mandatory to remove the oil from the sample surface prior to testing, without damaging the edges of the piece. Between the moment of removing the protective oil layer and actual test, corrosion can occur. This must be avoided by limiting this period of time, while keeping the pieces clean.

The following cleaning and conditioning procedure is considered to be good practice.

1. First use absorbent cleaning – tissue to remove the excess oil. Pay particular attention to the notch of the sample, but do not use hard (e.g. steel) brushes to remove the oil from the notch.
2. Before testing, the test pieces shall be conditioned at a temperature of 20°C ± 2°C for at least 30 minutes.

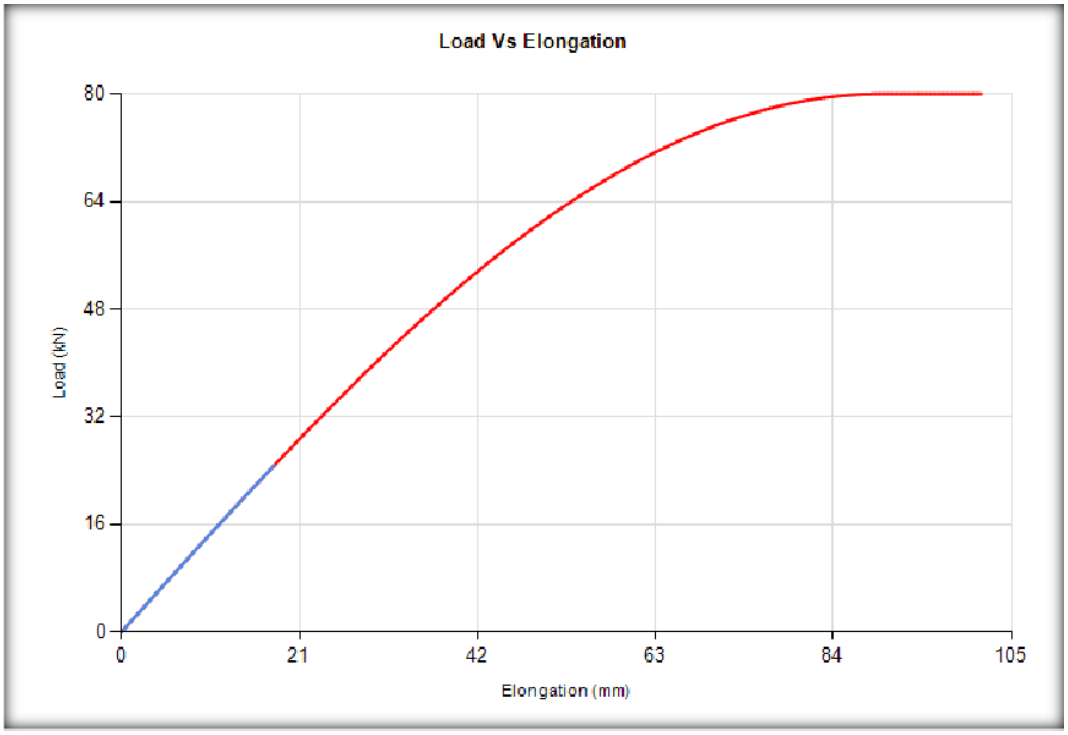
Category : Physical Properties

Sub-category: Impact Toughness

ULR No. : RC100920000000092F

PRINTER PORT FOR PRINTER INTERFACE

- GRAPH & RESULT PRINT-OUT
- BATCH CERTIFICATE PRINT - OUT
- TEST CERIFICATE PRINT -OUT
- SIMPLE STATICES PRINT - OUT



SOFTWARE TEST SCREEN

NEW TEST

New Test – Old Test data and graph get cleared and ready for new test.

User has to select the group in which he want to do testing.

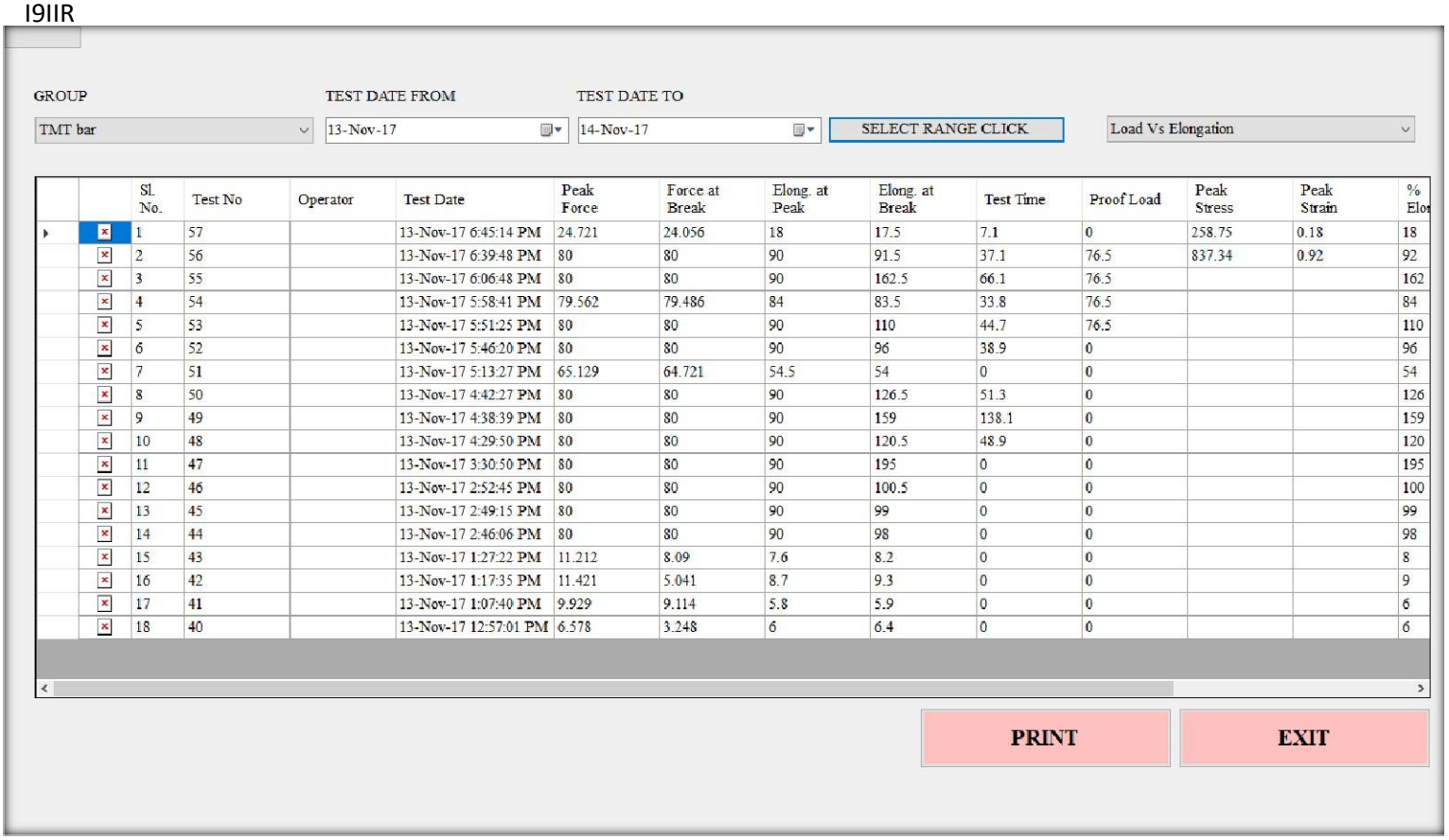
When user select a group all settings get loaded.

HISTORY

HISTORY

Here user can see all previous test and take print out from here.

I9IIR

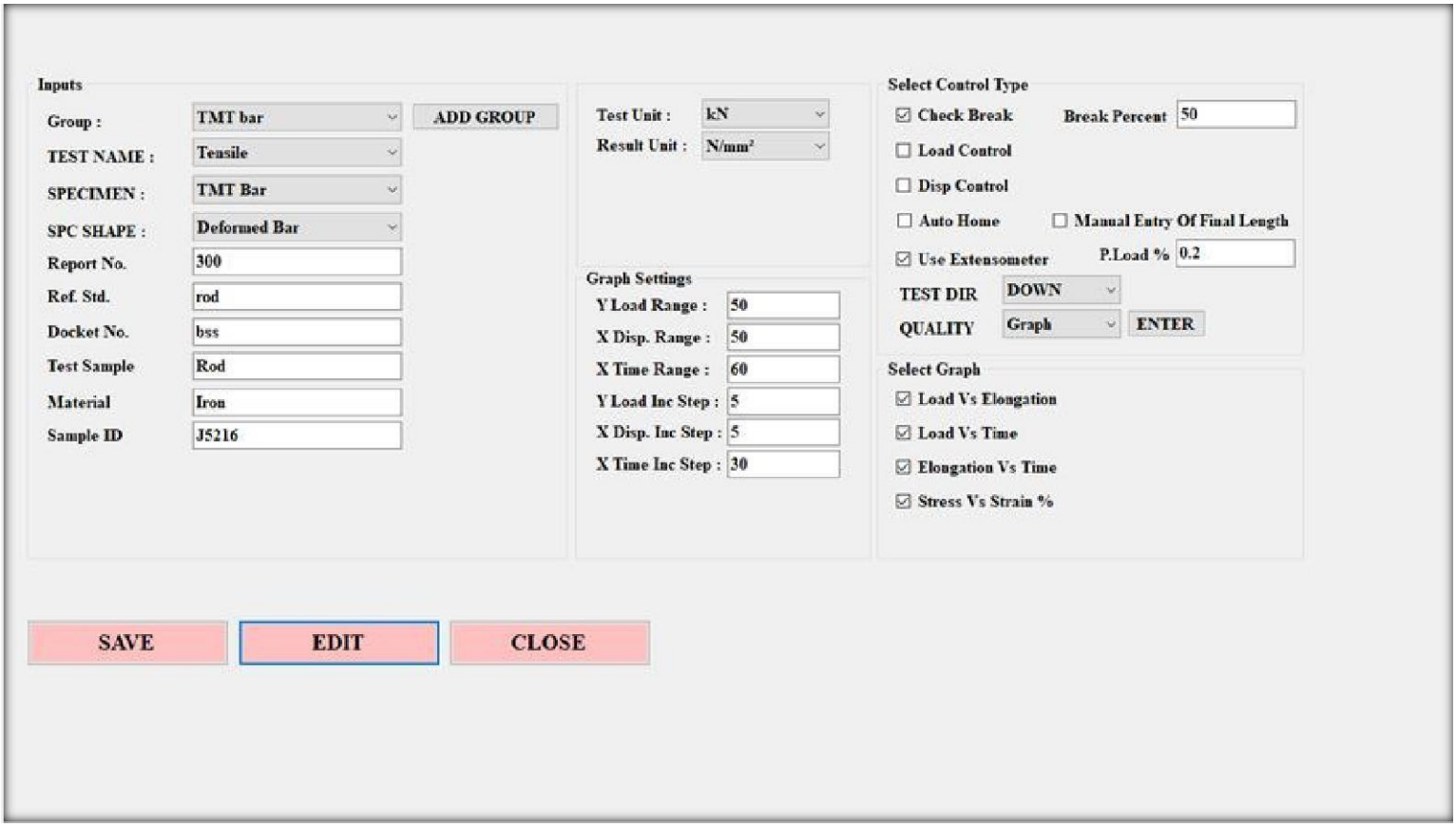


Sl. No.	Test No	Operator	Test Date	Peak Force	Force at Break	Elong. at Peak	Elong. at Break	Test Time	Proof Load	Peak Stress	Peak Strain	% Elo
1	57		13-Nov-17 6:45:14 PM	24.721	24.056	18	17.5	7.1	0	258.75	0.18	18
2	56		13-Nov-17 6:39:48 PM	80	80	90	91.5	37.1	76.5	837.34	0.92	92
3	55		13-Nov-17 6:06:48 PM	80	80	90	162.5	66.1	76.5			162
4	54		13-Nov-17 5:58:41 PM	79.562	79.486	84	83.5	33.8	76.5			84
5	53		13-Nov-17 5:51:25 PM	80	80	90	110	44.7	76.5			110
6	52		13-Nov-17 5:46:20 PM	80	80	90	96	38.9	0			96
7	51		13-Nov-17 5:13:27 PM	65.129	64.721	54.5	54	0	0			54
8	50		13-Nov-17 4:42:27 PM	80	80	90	126.5	51.3	0			126
9	49		13-Nov-17 4:38:39 PM	80	80	90	159	138.1	0			159
10	48		13-Nov-17 4:29:50 PM	80	80	90	120.5	48.9	0			120
11	47		13-Nov-17 3:30:50 PM	80	80	90	195	0	0			195
12	46		13-Nov-17 2:52:45 PM	80	80	90	100.5	0	0			100
13	45		13-Nov-17 2:49:15 PM	80	80	90	99	0	0			99
14	44		13-Nov-17 2:46:06 PM	80	80	90	98	0	0			98
15	43		13-Nov-17 1:27:22 PM	11.212	8.09	7.6	8.2	0	0			8
16	42		13-Nov-17 1:17:35 PM	11.421	5.041	8.7	9.3	0	0			9
17	41		13-Nov-17 1:07:40 PM	9.929	9.114	5.8	5.9	0	0			6
18	40		13-Nov-17 12:57:01 PM	6.578	3.248	6	6.4	0	0			6

INPUT

INPUT

All input settings are set here. Test Unit, Result Unit, Break Checking, Set Load, and Set Disp., whether to use extensometer or not, if proof load required set percentage for proof load, Test Direction and all other input parameters like test type, specimen, shape etc. Graph



REPORT

After each testing the report will be auto generated and saved into specified folder. User can generate a report directly from testing window and from history. range settings also here.

COMPANY NAME

Address

Contact number

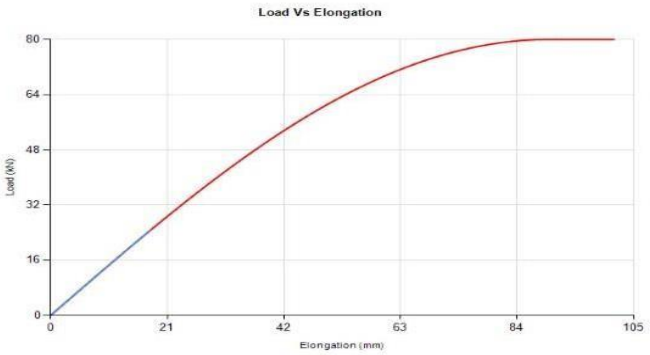
COMPONENT CERTIFICATION LAB

TEST REPORT

Test Report No.: 300 **Test Date:** 14-Dec-17 12:03:02 AM

TEST PARAMETERS

1. Reference Standard :	ROD
2. Docket No. :	Bss
3. Test Speed (mm/min) :	50
4. Test Sample :	SAMPLE ROD
5. Material :	MILD STEEL
6. Title of Test :	TENSILE
7. Sample ID No. :	J5216
8. Area (mm²) :	



TEST RESULTS

Sample No	Max. Load (N)	Max. Displacement / Stroke(mm)	Tensile Strength (N/mm²)	Elongation (%)	Measured Value of Test Piece		
					Thickness (mm)	Width (mm)	Length (mm)
1	80 kN	101 mm		101			
2	24.721 kN	17.5 mm		18			

Tested By,	Checked By,

EXCEL

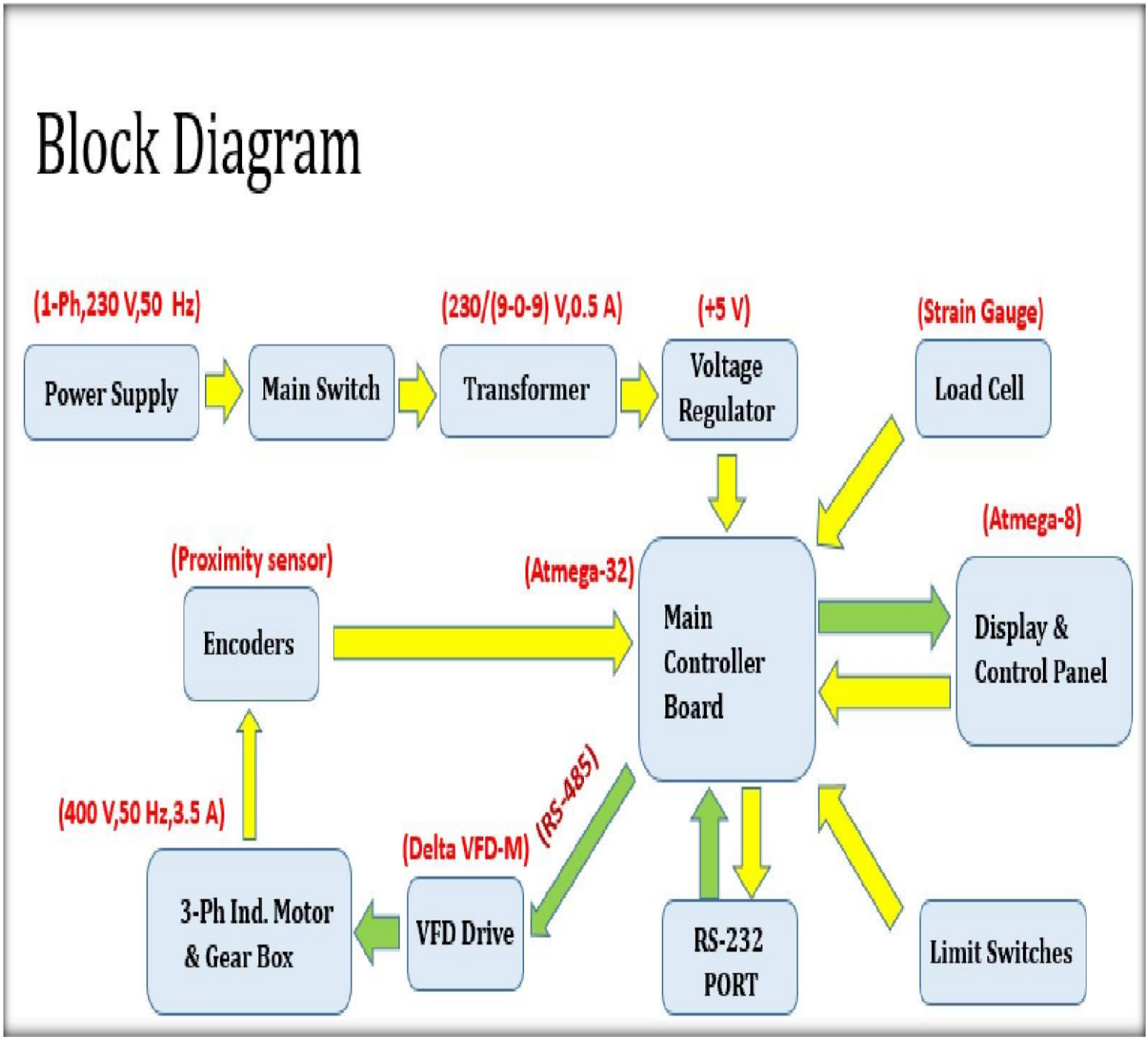
EXCEL

User save raw test data into excel file using this option. TEST

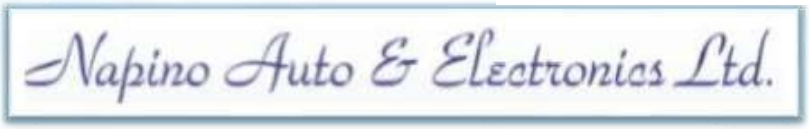
REPORT FORMAT

EXCEL ,PDF, WORD.

CONTROL PANEL



OUR VALUED CUSTOMERS



OUR VALUED CUSTOMERS

RESONANCE AUTOMATION AND MACHINES

PLOT NO. 1131 HARI ENCLAVE KIRARI SLEMAN NAGAR NEW DELHI-110086

PLANT 2ND H-936 RIICO CHOPANKI INDATRIAL AREA ALWAR RAJASTHAN-301707

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