

# Sheet Metal Fortified Joints Formation and Assessing Mechanical Properties



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**Abstract:** Geometrical precision is one of the most significant quality factors in sheet metal gathering, for example, a car body. The sheet metal fabricators have since quite a while ago assuaged on downpour busters and ultra-adaptability counteracts spills in unforgiving condition. The two essential joints incorporate the entire area of joints utilized in sheet metal congregations for auxiliary expansion. This paper shows the examination conduct of 10 check sheet metal fortified joints with mechanical properties like hardness test and Erichsen test. This outcomes gives improved comprehension of sheet metal get together forms and gives another plan to supportive item and procedure structure.

**Keywords:** Sheet metal, Bonded weld, Hardness test, Erichsen test, Seam joint.

## I. INTRODUCTION

The Sheet metal is essentially metal framed into dainty and level pieces. It is one of the main structures utilized in metalworking, and can be cut and bowed into a wide extent of shapes. Limitless common things are worked of the material. Sheet metal moreover has applications in vehicle bodies, plane wings, medicinal tables, rooftops for structures Architectural and different things. Sheet metal of iron and different materials with high charming weakness, by and large called overlaid steel centers, has applications in transformers and electric machines. Really, a basic utilization of sheet metal was in plate careful layer worn by mounted power, and sheet metal keeps having different brilliant uses, joining into steed tack. Sheet metal specialists are for the most part called "Tin Bashers",- "Tin Knockers" which is gotten from the beating of board wrinkles when showing tin rooftops.

## II. MATERIALS AND METHODS

The goal of this experimental work was to investigate the effects of before and after bonded welded joints of sheet metal work. The material 10 gauge sheets were used in this experiment having dimensions of 100X70mm seam joint. Initially the seam joints are applied by Adhesive (ARALDITE) and allowed to bond in the joints in 24 hours.

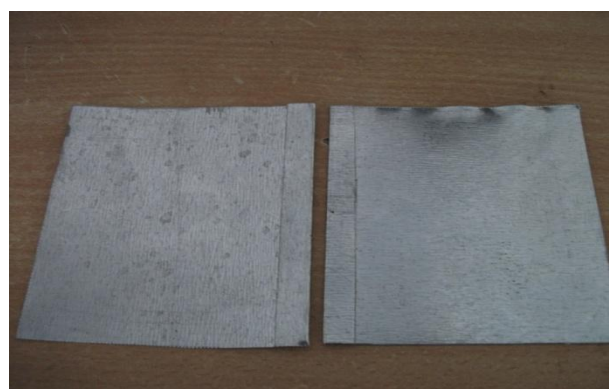


Fig.1. Seam joint sheet (10Gauge)

Table 1. Sheet thickness chart (inches)

Gauge	Nominal [in]	Max [in]	Min [in]
10	0.1345	0.1405	0.1285
11	0.1196	0.1256	0.1136
12	0.1046	0.1106	0.0986
14	0.0747	0.0797	0.0697
16	0.0598	0.0648	0.0548
18	0.0478	0.0518	0.0438
20	0.0359	0.0389	0.0329
22	0.0299	0.0329	0.0269
24	0.0239	0.0269	0.0209
26	0.0179	0.0199	0.0159
28	0.0149	0.0169	0.0129

Table2. Chemical & Mechanical Composition of GI Sheet

Grade	Chemical Composition (% Max)				Mechanical Properties		
	C	Mn	S	P	Tensile Strength (Kg/mm <sup>2</sup> )	Elog (% Min)	Hardness HV Max
D	0.12	0.50	0.04	0.040	28-42	28	125
DD	0.10	0.40	0.03	0.035	28-38	32	110
EDD	0.08	0.40	0.03	0.030	28-36	36	105
NA EDD	0.08	0.40	0.03	0.025	29 Min	36	95

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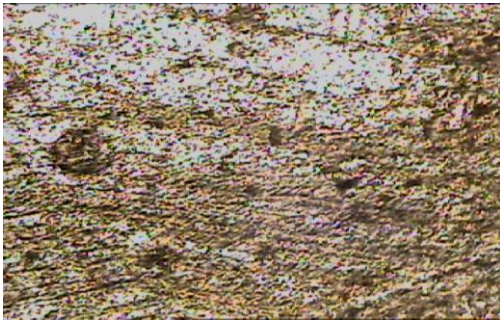
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*Trinocular Microscope*

The micro structure of Sheet metal seam bonded joints are analyzed by before and after joining using adhesive bond by Trinocular microscope. The Metallurgical properties of bonded joints are mentioned through micro structure are given below in fig. 2.



**Fig 2 Microstructure of Bonded joints**

**III. RESULTS AND DISCUSSION**

This experimental investigation of sheet metal bonded joints of 10 gauge sheets are analyzed through metallurgical properties and mechanical testing like Rockwell hardness testing machines and Erichen sheet test are conducted .The test results are given Below.

**Table 3. Rock well hardness test results**

Sl. No	Experiment Details	Load (kg)	Indentor used	Scale	RHN
1	Before bonding of seam joints	60	1/16'' steel ball indentor	F	60
2	After bonding of seam joints	60	1/16'' steel ball indentor	F	78

**Table 4. Erichsen sheet test results**

Experiment Detail	Drawing Force in Kg	Applied Force in Kg	Erichsen No
Before bonding of seam joints	30	10	5.55 mm
After bonding of seam joints	30	10	7.75 mm

**IV. CONCLUSION**

After conducting the experiments weld joint strength, stiffness and hardness were improved by using Adhesives (ARALDITE) Bond in sheet metal joints. It also analyzed by conducting metallurgical experiment through micro structural graphs. Hence sheet metal bonded welds suitable for preventing Leaks in harsh environment and can utilize the assembly of automotive parts with good geometrical accuracy

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