

STUD WELDING Reference Information

CD STUD WELD VISUAL INSPECTION

GOOD WELD

Full, even fillet all around stud.

- A. Correct power &
- B. Spring pressure.
- C. Equal magnetic grounding force.



COLD WELD

No or uneven fillet.

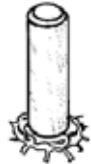
- A. Not enough power or
- B. Too much spring pressure.
- C. Unequal magnetic grounding forces.



HOT WELD

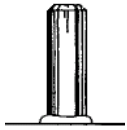
Large crater-excessive metal expulsion, very shiny appearance.

- A. Too much power or
- B. Not enough spring pressure.



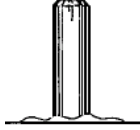
ARC STUD WELD INSPECTION (VISUAL)

90% OF ALL STUD WELDING PROBLEMS COME FROM INCORRECT SET-UPS.



GOOD WELD

Full, even, shiny fillet all around stud.



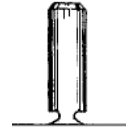
HOT WELD

Very shiny, low profile fillet extending beyond outside of ferrule.



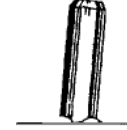
COLD WELD

Small, uneven, dull appearing fillet with fingers of metal extending through vents of ferrule.



SHORT PLUNGE OR HANG-UP

No fillet, no stud burn-off, or undercut base.



MISALIGNMENT

Partial or no fillet, undercut, stud not perpendicular to base metal.

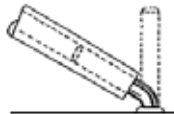
STUD WELD TESTING (PHYSICAL)

If, after visual inspection the weld quality is still questionable, or specifications require, the welded stud can be submitted to additional testing. The following are suggested physical tests.



BEND TEST WITH HAMMER

TORQUE TEST: The stud may be torqued with conventional torque testing equipment by applying torque until a predetermined torque or proof load is reached or until failure occurs.



BEND TEST WITH PIPE

BEND TEST: (See illustrations) By striking the stud with a hammer, or by sliding a length of pipe or tube over the stud, the stud can be bent a minimum of 30° away from its axis, or until failure occurs. Satisfactorily welded studs should exhibit a complete 90° bend without failure.

TENSILE TEST: The stud may be tested with conventional tensile testing equipment until a predetermined load is reached or until failure occurs.

OTHER: The stud and weld can be submitted to other conventional forms of destructive or non-destructive testing as specifications may require.

STUD MATERIALS

CAPACITOR STUDS

LOW CARBON STEEL

CHEMICAL PROPERTIES

- C -.23% Max.
- P -.040% Max.
- MN -.90% Max.
- S -.050% Max.

MECHANICAL PROPERTIES (Annealed)

- Tensile: 50,000 psi Min.
- Yield: 35,000
- Elongation in 2": 30%

STAINLESS STEEL - Type 302 or 305

MECHANICAL PROPERTIES

- Tensile: 85,000 psi Min.
- Yield: 40,000 psi Min.
- Elongation in 2": 35%

MECHANICAL PROPERTIES (Annealed)

- Tensile: 75,000 psi Min.
- Yield: 30,000 psi Min.
- Elongation in 2": 40%

ALUMINUM ALLOY 1100

MECHANICAL PROPERTIES

- Tensile: 21,000 psi Min.
- Yield: 20,000 psi Min.

ALUMINUM ALLOY 6061

- Tensile: 42,000 psi Min.
- Yield: 30,000 psi Min.

ARC STUDS

LOW CARBON STEEL

CHEMICAL PROPERTIES

- C -.23% Max.
- P -.040% Max.
- MN -.90% Max.
- S -.050% Max.

MECHANICAL PROPERTIES

- Tensile: 60,000 psi Min.
- Yield: 50,000 psi Min.
- Elongation in 2": 20%

MECHANICAL PROPERTIES (Annealed)

- Tensile: 50,000 psi Min.
- Yield: 35,000 psi Min.
- Elongation in 2": 25%

STAINLESS STEEL - Type 304 or 303

MECHANICAL PROPERTIES

- Tensile: 85,000 psi Min.
- Yield: 40,000 psi Min.
- Elongation in 2": 35%

MECHANICAL PROPERTIES (Annealed)

- Tensile: 75,000 psi Min.
- Yield: 30,000 psi Min.
- Elongated in 2": 40%

ALUMINUM ALLOY 5356

MECHANICAL PROPERTIES

- Tensile: 42,000 psi Min.
- Yield: 30,000 psi Min.

CD STUD LOAD STRENGTHS

*These values should develop fastener tensions to slightly less than yield

STUD MATERIAL	STUD SIZE	MAXIMUM FASTENING TORQUE (inch Lbs.)*	ULTIMATE TENSILE LOAD (Lbs.)	MAXIMUM SHEAR LOAD (Lbs.)
LOW-CARBON, COPPER-FLASHED STEEL	6-32	6	500	375
	8-32	12	765	575
	10-24	14	960	720
	1/4-20	43	1750	1300
	5/16-18	72	2900	2200
STAINLESS STEEL: 304	3/8-16	106	4300	3250
	6-32	10	790	590
	8-32	20	1260	940
	10-24	23	1530	1150
ALUMINUM ALLOY: 1100	1/4-20	75	2880	2160
	5/16-18	126	3750	5350
	3/8-16	186	4850	7150
	6-32	2.5	200	125
ALUMINUM ALLOY: 6061	8-32	5	295	185
	10-24	6.5	380	235
	1/4.20	21.5	670	415
	5/16-18	36	1125	695
BRASS: 70-30 (260) 65-35 (268)	3/8-16	53	1660	1000
	6-32	6.5	350	160
	8-32	13	560	229
	10-24	19	670	310
ALUMINUM ALLOY: 6061	1/4-20	40	1240	679
	5/16-18	70.5	2025	1210
	3/8-16	100	2985	1750
	6-32	8	600	390
BRASS: 70-30 (260) 65-35 (268)	8-32	16	860	560
	10-24	18.5	1040	680
	1/4-20	61	1950	1275
ALUMINUM ALLOY: 6061	5/16-18	102	3280	2140
	3/8-16	150	4800	3160

CD STUD WELDING

STUD & BASE METAL COMBINATION TO AVOID REVERSE SIDE MARKING

BASE METAL & STUD (Stud Flanged or Small Flanged)

