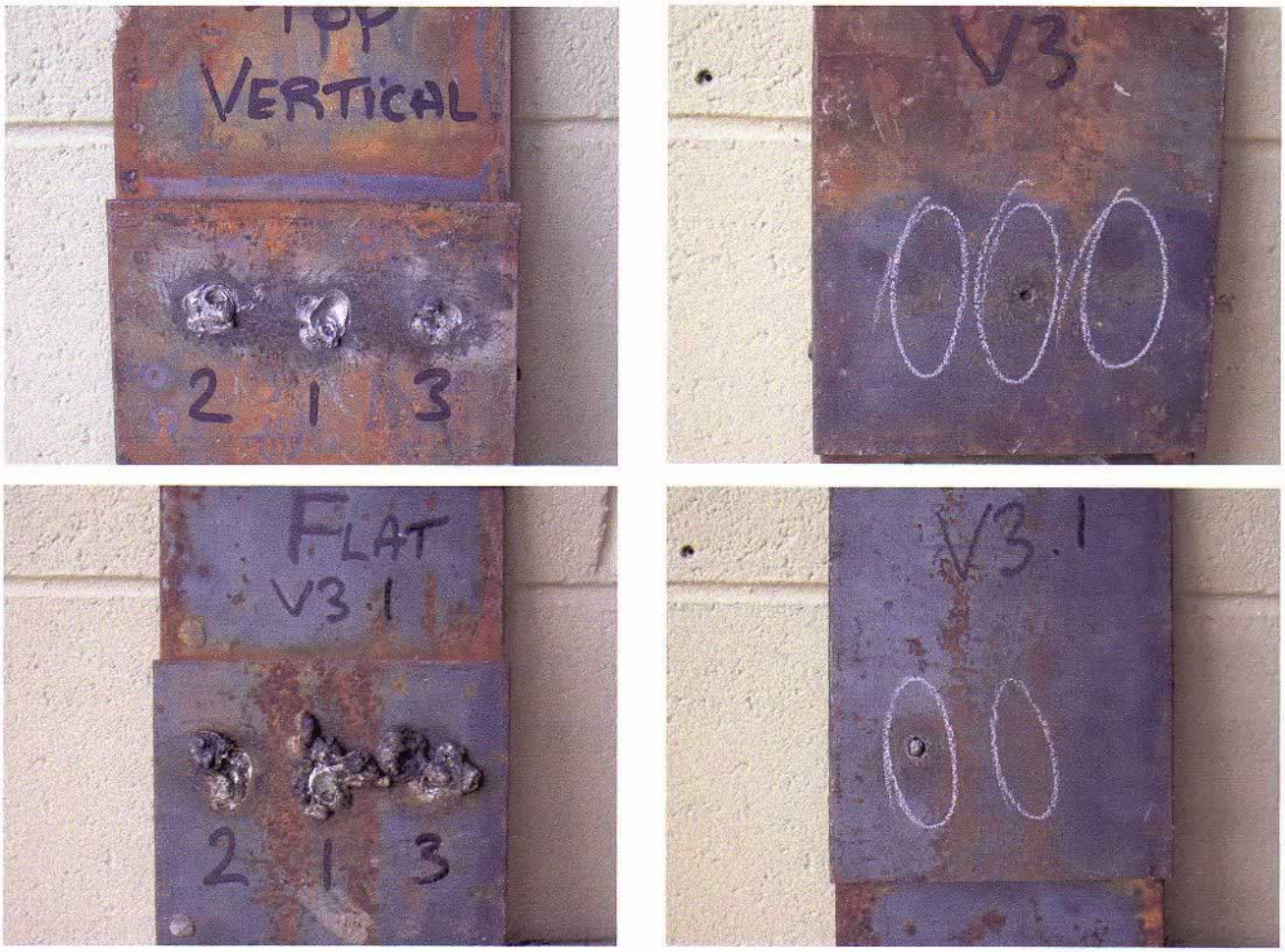
Sample V3 & V3.1

Three spot-welds made underwater using 4.0mm Hammerhead electrode on 2 x 15mm rusty plates in vertical position.



Shows plate set-up for three spot-welds, showing top and reverse side with heat and burn mark.

The following spot welds were made as described on page two, under evaluation and welding criteria. The only difference being these plates were allowed to go rusty by leaving them exposed to the environment following a seawater wash. At the time visibility was very poor.

The welding parameters & techniques for these plates were as follows.

Amps:	1st value 360-390 2nd value 180
Timer:	7-9 seconds for peak (1st) current value only
Volts:	30-35
Polarity:	DC-Ve electrode
Electrode Angle:	90° +/-10°
Pressure Applied:	Constant (5-10kgf) until at least 70-90% of electrode was consumed. Constant angle changes were made in a bid to aid filling of the joint. Pressure ease off at end of filling sequence when diver considered weld completed.

These welds were subjected to tensile tests, see test report numbers **S405242 & S405243** for further details.

NOTE: Early spring weather conditions, with typical air temperatures of 7-8°C recorded.

Bodycote MATERIALS TESTING
METAL TECHNOLOGY

Bodycote Materials Testing Ltd, Sheffield Laboratory, P.O. Box 161, Shepcote Lane, Sheffield, S9 1TR
Tel: 0114 256 4500, Fax: 0114 256 4509

Test Certificate

SPECIALITY WELDS
SUITE 18
MOORLANDS BUSINESS CENTRE
BALME ROAD
CLECKHEATON
BD19 4EW

Attn: DAVID KEATS

REF No S405242 : Issue 1
Ord No SW/2164-SA

Date Tested 24/06/04
Date Reported 24/06/04

Item - THREE SPOT WET IN 15mm PLATE - VERTICAL POSITION
V3 - USING 4.0mm HAMMERHEAD ELECTRODE

Specification - Client requirement

Tensile Test - EN 10 002-1

	Dimensions [mm]	Area [mm^2]	GL [mm]	YS [N/mm^2]	UTS [N/mm^2]	%El	%RA	Comments
001:Cross Weld	0.00x 0.00	0.00	N/A	N/A	0	N/A	N/A	See Below

UTS calculation is based on Shear Load / Approx cross sectional area of fractured weld 'nugget(s)'. Area = 363.98m2, Load =62.5 kN
UTS =172 MPa, 172 N/mm2,24947 p.s.i.
The above data is recorded, as requested by the client, for information only. Due to the nature of the testing and subsequent approximations assumed during post fracture measurement / calculation, the results may be subject to an unquantified level of uncertainty of measurement.

Certificate Comments

ORIGINAL TEST COUPON PRESENTED AND IDENTIFIED BY CLIENT.
Average diameter of nugget(s); external 'cap' side = 19.28mm.
This measurement, although quoted as a diameter, is based on 'average widths' due to the irregular shape of the remnant weld deposit.
This measurement is for information only, as requested by the client, and has not been used in any of the above caluculations.
---------- End of Text ----------

Tested by G.SIMPSON

.....
C Hill B.Sc
Snr Metallurgist/Q.A. Manager
For and on behalf of
Bodycote Materials Testing Ltd

Bodycote MATERIALS TESTING
METAL TECHNOLOGY

Bodycote Materials Testing Ltd, Sheffield Laboratory, P.O. Box 161, Shepcote Lane, Sheffield, S9 1TR
Tel: 0114 256 4500, Fax: 0114 256 4509

Test Certificate

SPECIALITY WELDS
SUITE 18
MOORLANDS BUSINESS CENTRE
BALME ROAD
CLECKHEATON
BD19 4EW

Attn: DAVID KEATS

REF No S405243 : Issue 1
Ord No SW/2164-SA

Date Tested 24/06/04
Date Reported 24/06/04

Item - THREE SPOT WET IN 15mm PLATE - FLAT POSITION
V3.1 - USING 4.0mm HAMMERHEAD ELECTRODE

Specification - Client requirement

Tensile Test - EN 10 002-1

	Dimensions [mm]	Area [mm^2]	GL [mm]	YS [N/mm^2]	UTS [N/mm^2]	%El	%RA	Comments
001:Cross Weld	0.00x 0.00	0.00	N/A	N/A	0	N/A	N/A	See Below

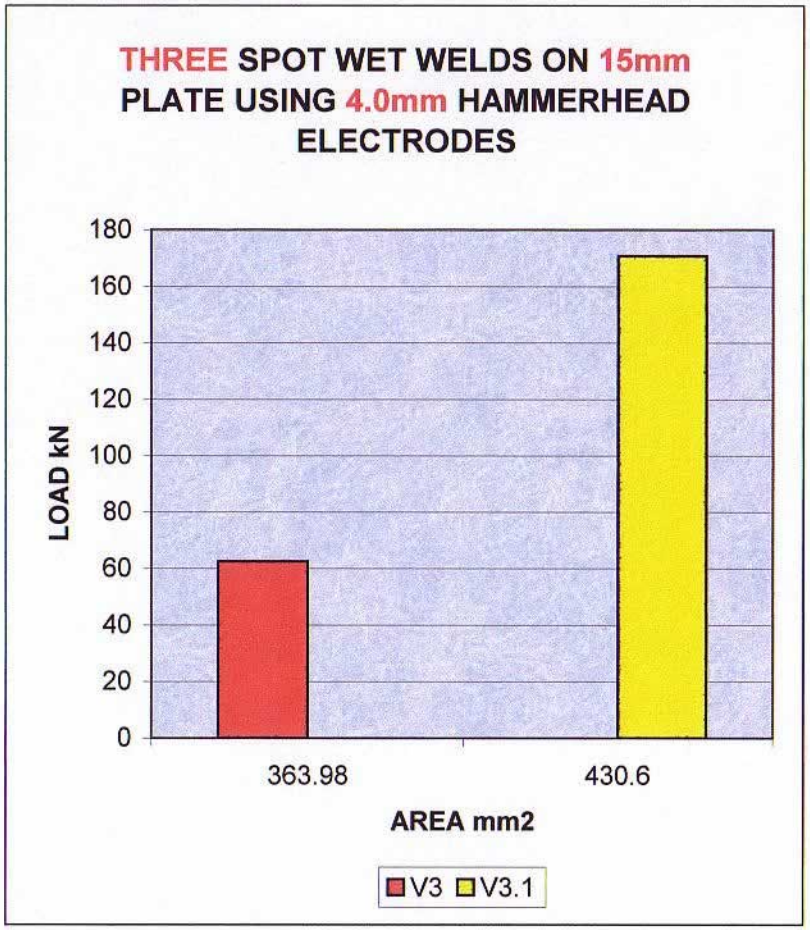
UTS calculation is based on Shear Load / Approx cross sectional area of fractured weld 'nugget(s)'. Area =430.60mm2, Load =170.8kN
UTS =397 MPa, 397 N/mm2, 57580 p.s.i.
The above data is recorded, as requested by the client, for information only. Due to the nature of the testing and subsequent approximations assumed during post fracture measurement / calculation, the results may be subject to an unquantified level of uncertainty of measurement.

Certificate Comments

ORIGINAL TEST COUPON PRESENTED AND IDENTIFIED BY CLIENT.
Average diameter of nugget(s); external 'cap' side =24.32 mm.
This measurement, although quoted as a diameter, is based on 'average widths' due to the irregular shape of the remnant weld deposit.
This measurement is for information only, as requested by the client, and has not been used in any of the above caluculations.
---------- End of Text ----------

Tested by G.SIMPSON

.....
C Hill B.Sc
Snr Metallurgist/Q.A. Manager
For and on behalf of
Bodycote Materials Testing Ltd


THREE SPOT WET WELDS ON 15mm PLATE USING 4.0mm HAMMERHEAD ELECTRODES
LOAD kN
180
160
140
120
100
80
60
40
20
0
363.98
430.6
AREA mm2
V3
V3.1