



Acrewood Way
St Albans
Hertfordshire
AL4 0JY
Tel: + 44 (0) 1727 840580
Fax: + 44 (0) 1727 816700
sales@esg.co.uk

Metallurgical Testing of Steel Samples and Site Condition Analysis – Camden Stables

for

Stanley Sidings Limited


Date:	17 th August 2016
File Reference Number:	0004292
Your Reference Number:	
Document Reference Number:	M9662R1

Metallurgical Testing of Steel Samples and Site Condition Analysis – Camden Stables

for

Stanley Sidings Limited

Prepared by:	Adam Kells
Title:	Senior Metallurgical Engineer

Approved by:	Tim Norman BSc MSc
Title:	Principal Materials Consultant
Signature:	

Prepared for:	Stanley Sidings Limited
Address:	54-56 Camden Lock Place London NW1 8AF For the attention of: Ben Blackledge

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Introduction

It was requested by Ben Blackledge of Stanley Sidings that ESG to attend site on 9th August 2016 to undertake sample removal

The number of samples to be taken was agreed on site with Ben Blackledge.

During the site visit, it was requested that visual analysis of the existing steel work also be undertaken, and comments to be made in this report on any findings.

Samples Removed

A total of six samples were removed from the supports for a balcony located within Camden Stables, these are identified 1 to 6.

For identification purposes the primary balcony supports were given numbers, with the numbering starting at the end of the balcony closest to the entrance of Camden Stables with this being denoted as location 1.

The following table shows the location for each sample:-

Sample	Location
1	Primary Steel at location 1.
2	Primary Steel at location 4.
3	Perimeter Steel at location 14
4	Secondary Steel at the rear of the balcony at location 2.
5	Perimeter Steel at location 16.
6	Secondary Steel at the front of the balcony at location 4.

Each of the samples removed was returned to our laboratory for metallurgical testing.

Visual Examination of Steel Sections

A visual examination of the steel sections being sampled was undertaken during the site visit.

The examination revealed the existing paint coating had failed some time ago and the exposed steel revealed signs of corrosion.

Some steels revealed a significant loss in section due to corrosion although this loss could not be quantified.

All of the steels revealed some degree of corrosion attack with a build up of corrosion product.

Where the brick arches were located no visual assessment of the steel section could be made.

Chemical Composition

All six samples were analysed using optical emission spectroscopy. The results are detailed in Appendix I.

Metallographic Examination

Cross sections of all samples were encapsulated in thermosetting resin and polished to a one micron finish for examination under a metallurgical microscope. The microstructures were assessed in the as polished and etched condition (2% Nital).

In all cases the microstructure consisted of grains of ferrite and some pearlite identifying the material as a mild steel material and consistent with the compositions for each sample.

Hardness Determinations

Hardness tests carried out on the cross sections using the Vickers method to BS EN ISO 6507-1 2005. The hardness values can be converted to an approximate tensile strength (UTS) according to BS EN ISO 18265:2013.-

The results are detailed below:-

Sample	HV 10	Average HV	Approx UTS MPa
1	128, 130	129	412
2	137, 135	136	433
3	169, 155	158	504
4	128, 123	126	403
5	146, 142	144	462
6	107, 108	108	344

Discussion of Results

- All samples are weldable structural steels. The sulphur and phosphorus content of samples 1 and 2 indicate that they are of early manufacture.
- The hardness values are consistent with the compositions.

- The approximate tensile strength shows that the primary steels are equivalent to grade S235 (grade 40) steel, the secondary steels to be no better than grade S235 (grade 40) with the perimeter steels possibly equivalent to grade S275 (grade 43).

Comments

Visual examination of the steels was undertaken during the site sampling process. It was found that some of the steels revealed significant loss in section due to corrosion.

It was found that each of the steel sections still had corrosion products on their surfaces. This could have some significant effect on the new balustrade that has already been installed on top of the corrosion product. Furthermore if the secondary steels are not cleaned before any concrete/screed is laid the corrosion could cause issues with the longevity of the concrete.

It would be prudent to clean the steel sections of corrosion and apply a corrosion protection system.

It may be advisable that a thickness survey of the steel sections be undertaken to give an indication of the actual loss in section and also examine the steel contained within the brick arches in selected locations for possible corrosion damage.

Quality Statement

We confirm that in preparing this report we have exercised all reasonable skill and care.

Any information relating to the sample received for testing has been supplied by the client unless otherwise specified.

This report does not provide 'product approval' status but shows only the results of the material or sample tested.

Copyright and Intellectual Property Rights

Unless specifically assigned or transferred within the terms of the agreement, the Consultant asserts and retains all Copyright, and other Intellectual Property Rights, in and over the report and its contents.

Any samples relating to this report will be retained for a period of one month from the date of the report, unless you request differently.

Appendix I

Stanley Sidings Limited
54-56 Camden Lock Place
London
NW1 8AF



Your Ref
Our Ref 0004292
Date 17/08/2016

STEEL SAMPLES FOR CHEMICAL ANALYSIS

Certificate Number M11496
Date of Receipt 09/08/2016 Date of Test 16/08/2016

Identified		Sample 1	Sample 2	Sample 3	Sample 4
Carbon	%	0.18	0.25	0.20	0.17
Silicon	%	0.08	0.06	0.05	0.05
Manganese	%	0.63	0.59	1.09	0.29
Sulphur	%	0.089	0.057	0.010	0.047
Phosphorus	%	0.059	0.064	0.010	0.059
Nickel	%	0.02	0.02	0.03	0.01
Chromium	%	0.01	0.01	0.02	0.01
Molybdenum	%	<0.01	<0.01	<0.01	<0.01
Copper	%	0.06	0.05	0.02	0.06
Vanadium	%	0.01	0.01	0.01	0.01
Niobium	%	0.01	0.01	0.01	0.01
Titanium	%	<0.01	<0.01	<0.01	<0.01
Aluminium	%	<0.01	<0.01	<0.01	<0.01
Cobalt	%	0.01	0.01	<0.01	0.01
Carbon Equivalent Value	%	0.30	0.36	0.39	0.23

Analytical Technique – Optical Emission



T Norman BSc, MSc
Principal Materials Consultant

End of Report

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Environmental Scientifics Group Limited
Reg office: ESG House, Bretby Business Park, Ashby Road, Burton Upon Trent, DE15 0YZ
Incorporated in England: 02880501

Stanley Sidings Limited
54-56 Camden Lock Place
London
NW1 8AF



Your Ref
Our Ref 0004292
Date 17/08/2016

STEEL SAMPLES FOR CHEMICAL ANALYSIS

Certificate Number M11497
Date of Receipt 09/08/2016 Date of Test 16/08/2016

Identified		Sample 5	Sample 6
Carbon	%	0.11	0.13
Silicon	%	0.14	0.06
Manganese	%	0.73	0.32
Sulphur	%	0.015	0.030
Phosphorus	%	0.012	0.043
Nickel	%	0.11	0.01
Chromium	%	0.11	0.01
Molybdenum	%	0.02	<0.01
Copper	%	0.34	0.06
Vanadium	%	0.01	0.01
Niobium	%	<0.01	0.01
Titanium	%	<0.01	<0.01
Aluminium	%	<0.01	<0.01
Cobalt	%	0.01	0.01
Carbon Equivalent Value	%	0.29	0.19

Analytical Technique – Optical Emission



T Norman BSc, MSc
Principal Materials Consultant

End of Report

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