Karlsruher Institut für Technologie

Versuchsanstalt für Stahl, Holz und Steine
(Amtliche Materialprüfungsanstalt)
Karlsruher Institut für Technologie (KIT)

Leitung: Univ.-Prof. Dr.-Ing. H. J. Blaß und Univ.-Prof. Dr.-Ing. T. Ummenhofer

TEST REPORT

No.: 123004-1

Cyclic Movement Tests

Customer and Production Plant:	BEMO SYSTEMS GmbH Friedrich-List-Str. 25 74532 Ilshofen-Eckartshausen
Basis of the evaluation:	Order from 03.02.2012
Objectives of the evaluation:	Cyclic movement tests on BEMO-Flat Roof standing seam profile 65/400 with BEMO Halter 160/60 of Aluminium EN AW-6060, T66

This report consists of 5 pages and 5 appendixes (6 pages).

Date of issue: 10.05.2012

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1 Preliminary Remarks

The company BEMO SYSTEMS GmbH, Ilshofen-Eckartshausen commissioned the Versuchsanstalt für Stahl, Holz und Steine to report about the tests with cyclic linear movements of the BEMO Flat Roof standing seam profile type 65/400 with BEMO Halter 160/60 of Aluminium EN AW-6060, T66.

2 Object and scope

The test was conducted on BEMO Systems standing seam profile type 65/400 with a nominal thickness of 1,00mm (annex 1) and with a 25µm polyester-coating on the backside of the panel and a 6µm organic coating on the top side of the panel. The certificate of quality of the aluminium alloy that was used for the production is attached in annex 2. The purpose of the test was to determine the wear and tear behavior of the BEMO Flat Roof standing seam profile type 65/400 panel with the halter 160/60 consisting of Aluminium EN AW 6060, T66 after repetitive cyclic movement of 100.000 cycles. The test program was issued by the BEMO.

3 Testing

3.1 General

The customer provided the test-setup, the test samples and the test equipment for the cyclic movement test. The cyclic movement tests have been performed at the BEMO test facility in Ilshofen-Eckartshausen, Germany by the members of the company BEMO.

3.2 Test Setup

The test setup consisted of a rigid wooden substructure on which three c-profiles (top-hat profiles, height 80mm, width 80mm, length 1500mm, thickness 1,5mm of steel, see annex 3) have been attached as a basis for the halter 160/60 (height 160mm, length 60mm). On each top hat profile three halters have been mounted with four self drilling screws type EJOT JT3-x-2-6,0x36 (see figure 5.3, annex 5). The halter in the center was the tested halter. The other halter had the same height but didn't consist of the same material. On top of the halter, two standing seam profiles type 65/400, thickness 1,00mm have been mounted from the customer with mechanical seaming tool to form the panel seam (see figure 4.1, annex 4). The panels spanned over 3 supports with spans being 1,50m. To receive the requested load on the halter in the center, two boxes with an total weight of 2,091kg have been glued on the standing seam profile type 65/400 right above the halter in the center (see figure 4.2, annex 4). The weight per 1m length of one standing seam profile was 1,567kg/m.

The panels were attached to the piston of the air cylinder, which moved the panels a distance of 9mm on either side of the clip centerline controlled by a switch (18mm total travel of the profile at the beginning and 17mm at the end). The load for the movement was introduced in the standing seam profiles (see figure 4.3, annex 4).

3.3 Cyclic testing

The test was started on 02.02.2012, 17:00 and with an interruption at 99900 cycles concluded on 03.02.2012, 15:00. The panel and clip setup was subjected to 100.000 cycles. The time period for 99900 cycles was 22 hours. This gives a time period for one each cycle of approximately 0,8 sec. The test was recorded by a web camera. The panel and clip setup continued to slide after 100.000 cycles. The test was stopped after 100.003 cycles.

3.4 Observation

There was no sign of abrasion on the top of the top profile (see figure 5.1, annex 5) or on the top of the bottom profile (see figure 5.2, annex 5). There was some wear on the contact surface of the halter and the panel (see figure 5.3 and 5.4, annex 5).

4 Conclusion

The company BEMO SYSTEMS GmbH, Ilshofen-Eckartshausen commissioned the Versuchsanstalt für Stahl, Holz und Steine to report about tests with cyclic linear movement of the BEMO standing seam profile type 65/400 with a nominal thickness of 1,00mm together with BEMO Halter 160/60 of Aluminium EN AW 6060, T66 to determine the wear and tear behavior after 100.000 cycles.

The standing seam profile was coated with a 25µm polyester-coating on the backside and a 6µm organic coating on the top side of the panel. The test program was issued by the BEMO SYSTEMS GmbH.

The test setup is described in chapter 3.2 and consisted of 3 times 3 halters. The panels spanned over 3 supports. The halter in the center was the halter to be tested. On top of the halters, two 4,00m long standing seam profiles have been mounted. Above the halter in the center an additional weight of 2,091kg was applied. The span between the supports (halters) was 1,50m. The panels were moved 9mm to either side by an air cylinder.

The test was started on 02.02.2012 and was stopped after 100.003 cycles on 03.02.2012.

After the test there was no sign of abrasion on the top side of the top profile and on the top side of the bottom profile. There was some wear on the contact surface of the halter and the profile.

Karlsruhe, am 10.05.2012 Sd/pc

Official in Charge: Head of department

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Amtliche Materialprüfungsanstalt
Karlsruher Institut für Technologie
(05)
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Dipl.-Ing. J. Schmied Dr.-Ing. Th. Misiek

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6040 AA Roermond
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CERTIFICATE OF QUALITY	NUMBER 23304	EN 10204

Delivery Address

Maas Profile GmbH & Co. KG
Friedrich-List-Strasse 25
74532 Ilshofen-Eckartshau
GERMANY

Maas Profile GmbH & Co. KG
Friedrich-List-Str. 25
74532 Ilshofen-Eckartshau
GERMANY

Reference : EBE122829
Sales Order : 225645 / 10
Item : Aluminium
Dimension Set : 2072877 1250X1,00 60R0119.35
Customer Part Nr.: RAL 6019 H44 / 1,00
Alloy / Temper : 3005 / H44

Mechanical properties and chemical composition

IdNo / Bundle	Weight	Elongation	Proof Stress (Mpa)	Tensile Strength (Mpa)	Fe %	Cr %	Ti %	Zn %	Mg %	Mn %	Si %	Cu %
8913699	2310 kg	5,0	159	180	0,440	0,010	0,010	0,010	0,370	1,120	0,200	0,140
8913700	1175 kg	5,0	157	182	0,480	0,003	0,018	0,003	0,370	1,060	0,160	0,130

If no value is shown, this element is present for less than 0,010%. Rest of % is aluminium.

Mechanical properties are calculated to temper after painting.

Roermond, 21-07-2010

EURAMAX COATED PRODUCTS B.V.
(as manufacturer)

Quality Department - P.Geelen

Table 1.1: Data sheet for standing seam profile

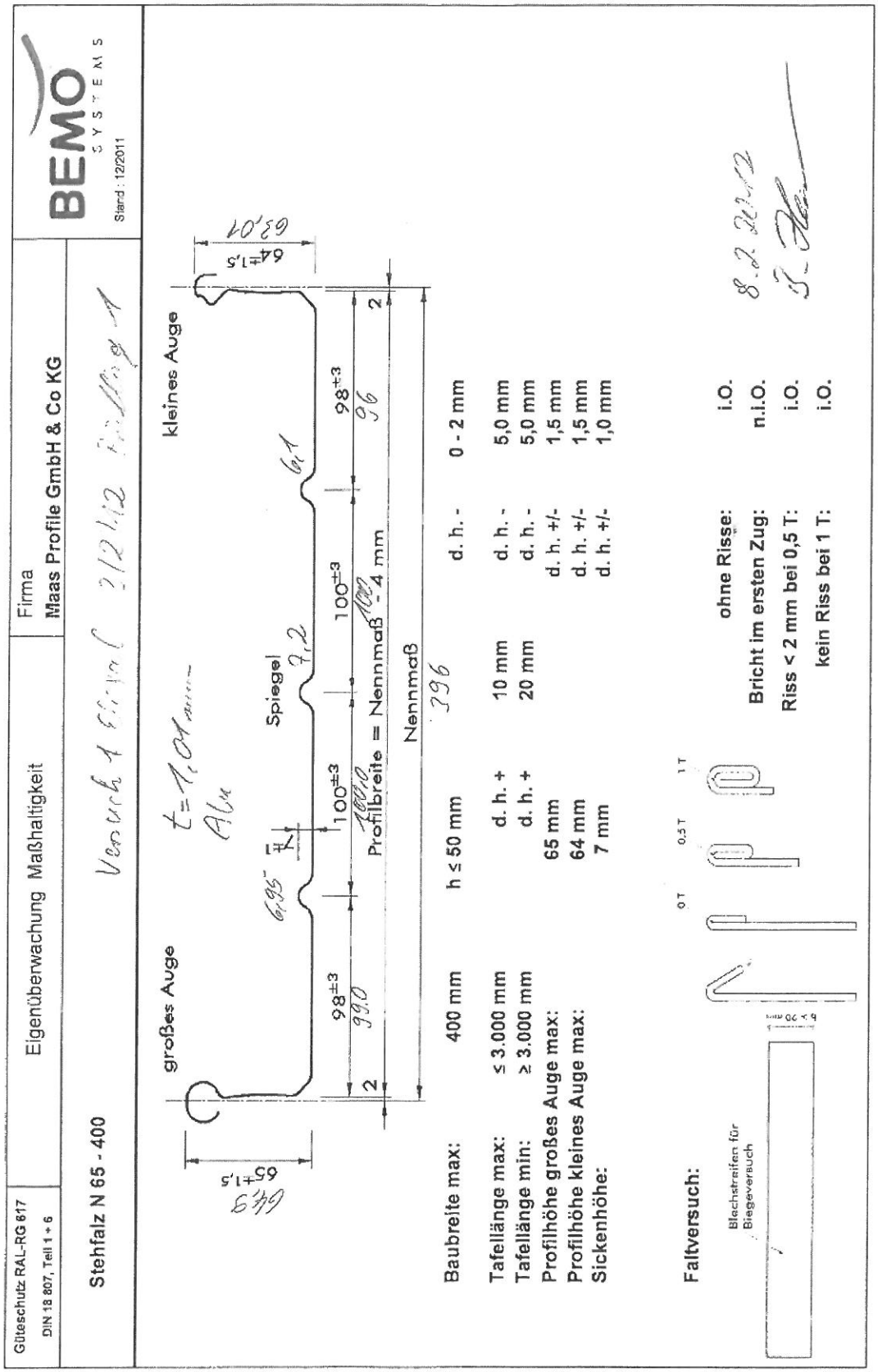

Table 1.2: Dimensions of standing seam profile

ArcelorMittal
ArcelorMittal SSC Deutschland GmbH
Niederlassung Burbach
Carl-Benz-Str. 10-12 · D-57299 Burbach

PRUEFBESCHEINIGUNG
Zugversuch nach EN ISO 6892-1
ARCELORM.-PRUEFZEUGNIS

Nr. : 43020 vom : 29/06/2011
Kunde : 3032030

MAAS Profile GmbH & Co.KG
Friedrich-List-Straße 25

74532 Ilshofen
Deutschland

Auftrag-Nr. : 51932/1
Ku.-Auft.Nr. : EBE128220
Ku.-Art.Nr. :

Auf.Nr : 051932/[redacted]
Qualität : GUETE S250 GD+Z275 RAL9002 DU 15MY OSF / Gemäss EN 10346

Abmessu: 1.50 X 1250.00 12.620 Tonnen
(-) -> 0.110 0.00
(+) -> 0.110 6.00

Schmelz-Nr	COIL-Nr	Chemische Analyse C(%)	Mn(%)	P(%)	S(%)	Si(%)	Al(%)
814410	504058040K	0.063	0.260	0.010	0.009	0.006	0.039
814420	504058010K	0.063	0.260	0.010	0.009	0.006	0.039

Probe-Nr	COIL-Nr	Coil	Mechanische Technologische Prüfungen Rich	Rp0.2 Mpa	Rm Mpa	A% A80
814420	504058010K	814420	T	305	366	33.0
814410	504058040K	814410	T	305	366	33.0

361711
361697
361696
361708

MAAS PROFILE
26. Juli 2011
Friedrich-List-Str. 25, 74532 Ilshofen
Tel: (07904) 9714-0, Fax: 9714-151
Email: info@maasprofile.de

Die gestellten Anforderungen sind erfüllt.
Das Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig.

BURBACH Am 29/06/2011

Table 2.1: Data sheet for hat-profile

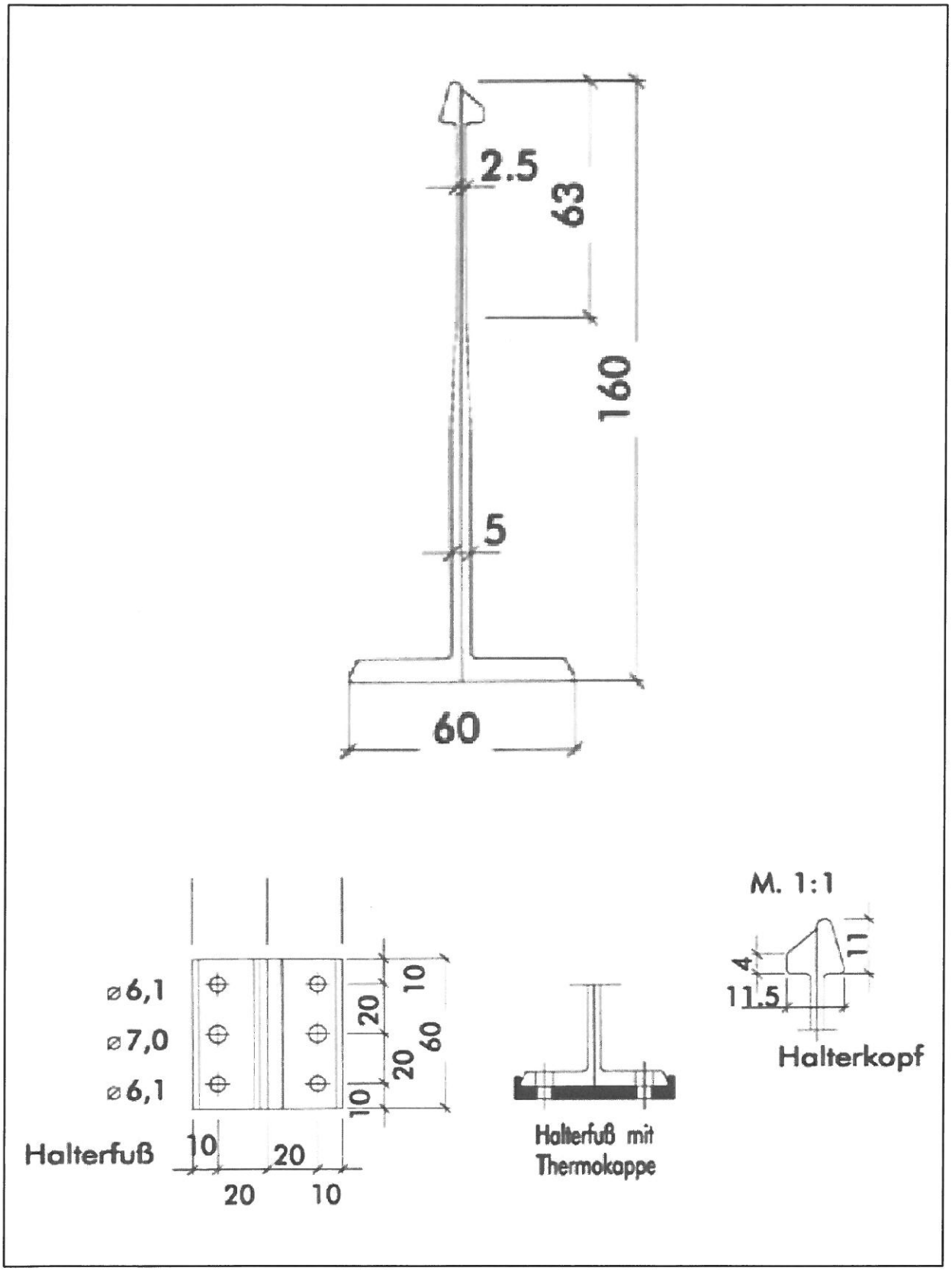

Table 3.1: Data sheet halter

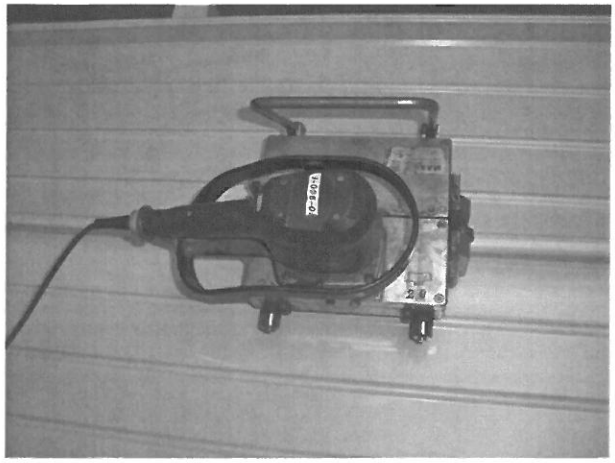

Figure 4.1: Seaming

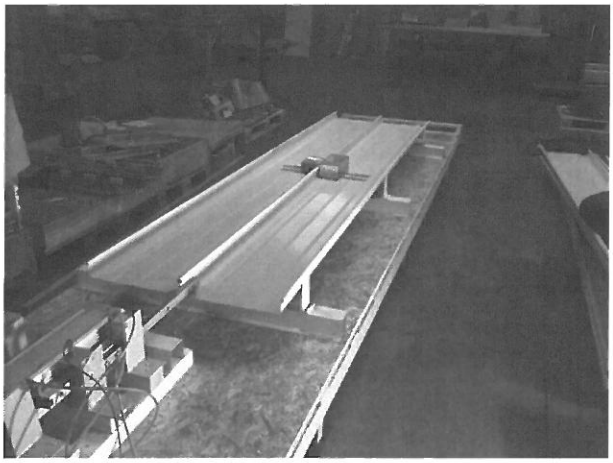

Figure 4.2: Test setup

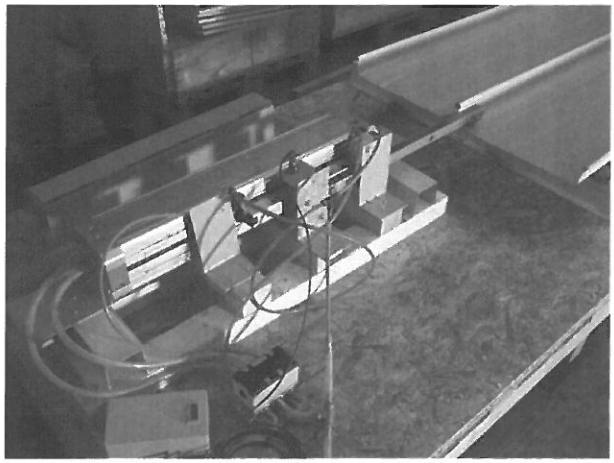

Figure 4.3: Load cylinder and application

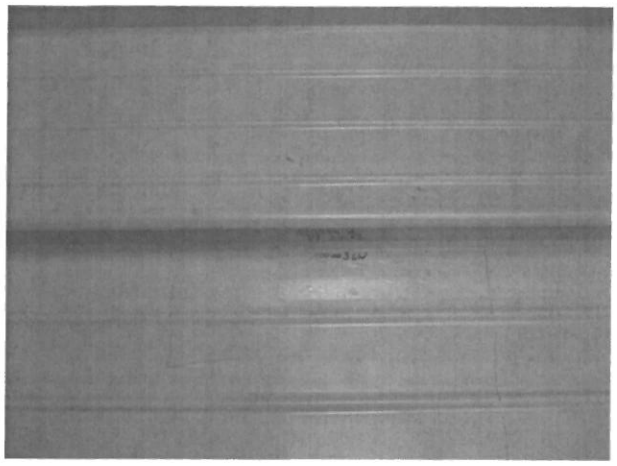

Figure 5.1: Center after test

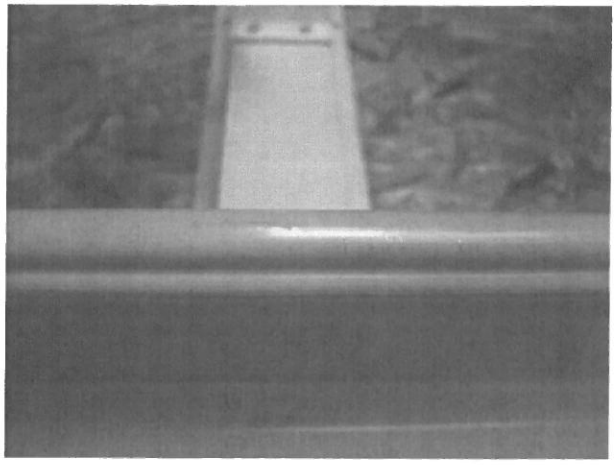

Figure 5.2: Bottom standing seam profile at central halter after test

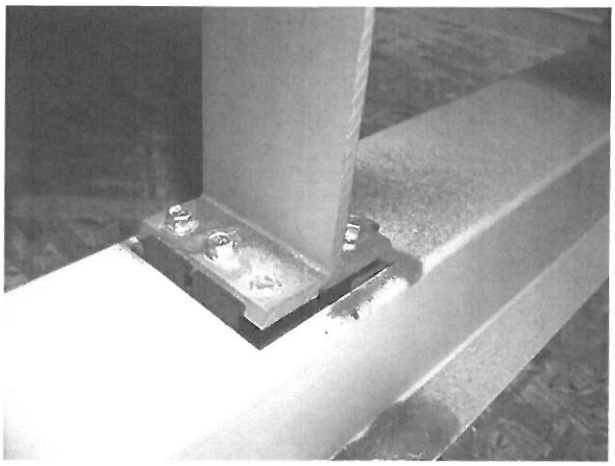

Figure 5.3: Central halter after test

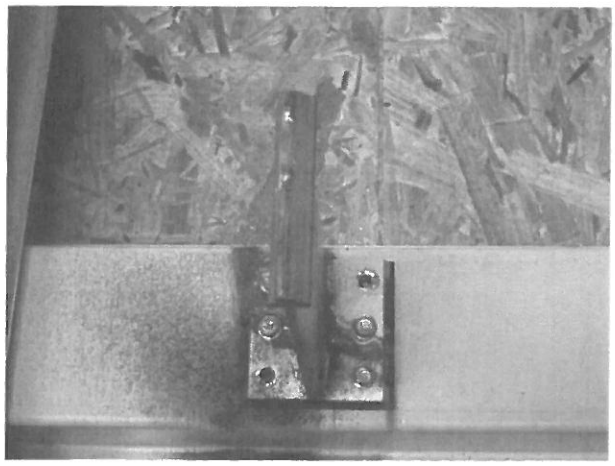

Figure 5.4: Central halter after test