



U.S. Department
of Transportation
**Federal Highway
Administration**

1200 New Jersey Ave., SE
Washington, D.C. 20590

December 29, 2010

In Reply Refer To:
HSST/B-208

Mr. Wolfgang Wink
Volkmann and Rossbach
Hohestrasse 11-19
D-5601 Montabaur, Germany

Dear Mr. Wink:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system:	VarioGuard "C" Freestanding Barrier
Type of system:	Steel roadside and median barrier
Test Level:	NCHRP Report 350 Test Level 3 (TL-3)
Testing conducted by:	TRL, United Kingdom
Task Force 13 Designator:	SGM30
Date of request:	July 28, 2010
Date initially acknowledged:	September 9, 2010
Date of completed package:	December 20, 2010

You requested that we find this system acceptable for use on the National Highway System (NHS) under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Decision:

The following device was found acceptable, with details provided below:

- VarioGuard "C" Freestanding Barrier

Requirements

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350 or the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware. The FHWA memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.



Description

The VarioGuard “C” is a portable 900-mm tall steel barrier consisting of the following four principal elements:

- 1) A 2.5 mm-thick shell
- 2) A 700-mm wide by 378-mm tall base unit
- 3) 855-mm long intermediate posts
- 4) A 180-mm wide by 150-mm tall box beam top rail

The barrier’s narrow profile allows it to be used where lane-width is at a premium while its wide base provides stability when impacted. Drawings of the VarioGuard “C” are enclosed for reference.

Crash Testing

The VarioGuard barrier had been tested in Europe to meet the CEN standard “H2 of DIN EN 1317-2.” H2 consists of the following tests:

- 900 kg small car at 100 km/hr impacting at 20 degrees
- 13,000 kg single unit truck at 70 km/hr impacting at 20 degrees

While the H2 small car test is comparable to the 820C test of NCHRP Report 350, the truck test greatly exceeds the severity of both the NCHRP Report 350 2000P TL-3 impact (Test 3-11) and the 8000S impact (Test 4-12) for TL-4. This testing showed that the VarioGuard had the strength to redirect a large truck, however, FHWA requested the NCHRP Report 350 Test 3-11 be run in order to demonstrate performance with the 2000P pickup truck, a relatively unstable vehicle in barrier crash tests.

The NCHRP Report 350 Test 3-11 was conducted in substantial conformity with the NCHRP Report 350 by the Transport Research Laboratory in the United Kingdom. The test article consisted of 25 sections of 12-meter long VarioGuard “C” quick jointed barriers. The units were connected with a single M16 bolt. Each 12-m unit consisted of three 4-m long sections that were bolted together. The complete installation was 300 meters long and was completely free-standing with no terminal pins at the ends of the barrier. All occupant risk factors were met, and the permanent and dynamic deflections were measured at 2.92 meters. The working width was determined to be 3.62 meters. The test data summary sheet is enclosed for reference.

Findings

The system described in the requests above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B-208 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The VarioGuard barriers are patented products and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

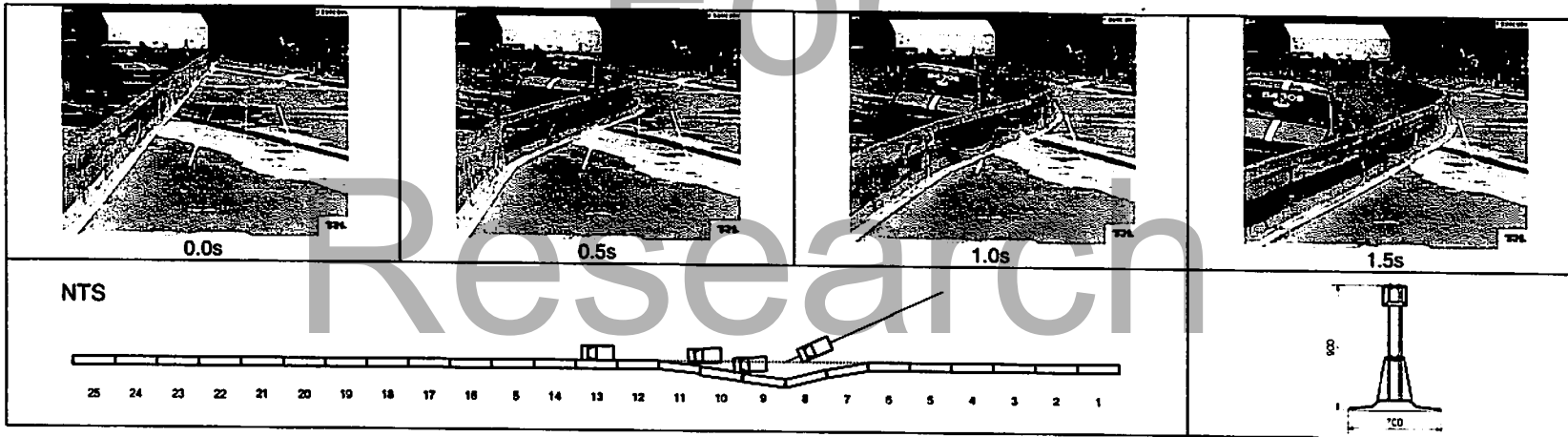
Sincerely yours,



Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

11 SUMMARY SHEET



4. General Information

Test Agency..... TRL
 Test No..... B4309
 Date..... 02 June 2010

5. Test Article

Type..... Temporary
 Name..... VarioGuard "C"
 Installation Length (m)..... 300
 Size and/or dimension and material of key elements..... 12m quick jointed barrier sections, 0.7m wide, 0.9m high.

6. Soil Type and Condition

N/A – surface mounted no (terminal pins)

7. Test Vehicle

Type..... Production
 Designation..... 2000P
 Model..... Chevrolet C/K 2500
 Mass (kg) Kerb..... 2189
 Test inertial..... 2026
 Dummy(s)..... N/A
 Gross Static..... 2026

8. Impact Conditions

Speed (km/h)..... 99.1
 Angle(deg)..... 26.2

9. Exit Conditions

Speed (km/h)..... N/A - vehicle did not exit barrier
 Angle(deg)..... N/A - vehicle did not exit barrier

10. Occupant Risk Values (CFC180)

Impact Velocity (m/s)
 x-direction..... 4
 y-direction..... -5
 THIV (km/h)..... 24
 Ridedown Accelerations (g)
 Longitudinal..... -8
 Lateral..... 8
 PHD (g)..... 10
 ASI..... 0.9

11. Test Article Deflections (m)

Dynamic..... 2.92
 Permanent..... 2.92
 Working Width..... 3.62

12. Vehicle Damage

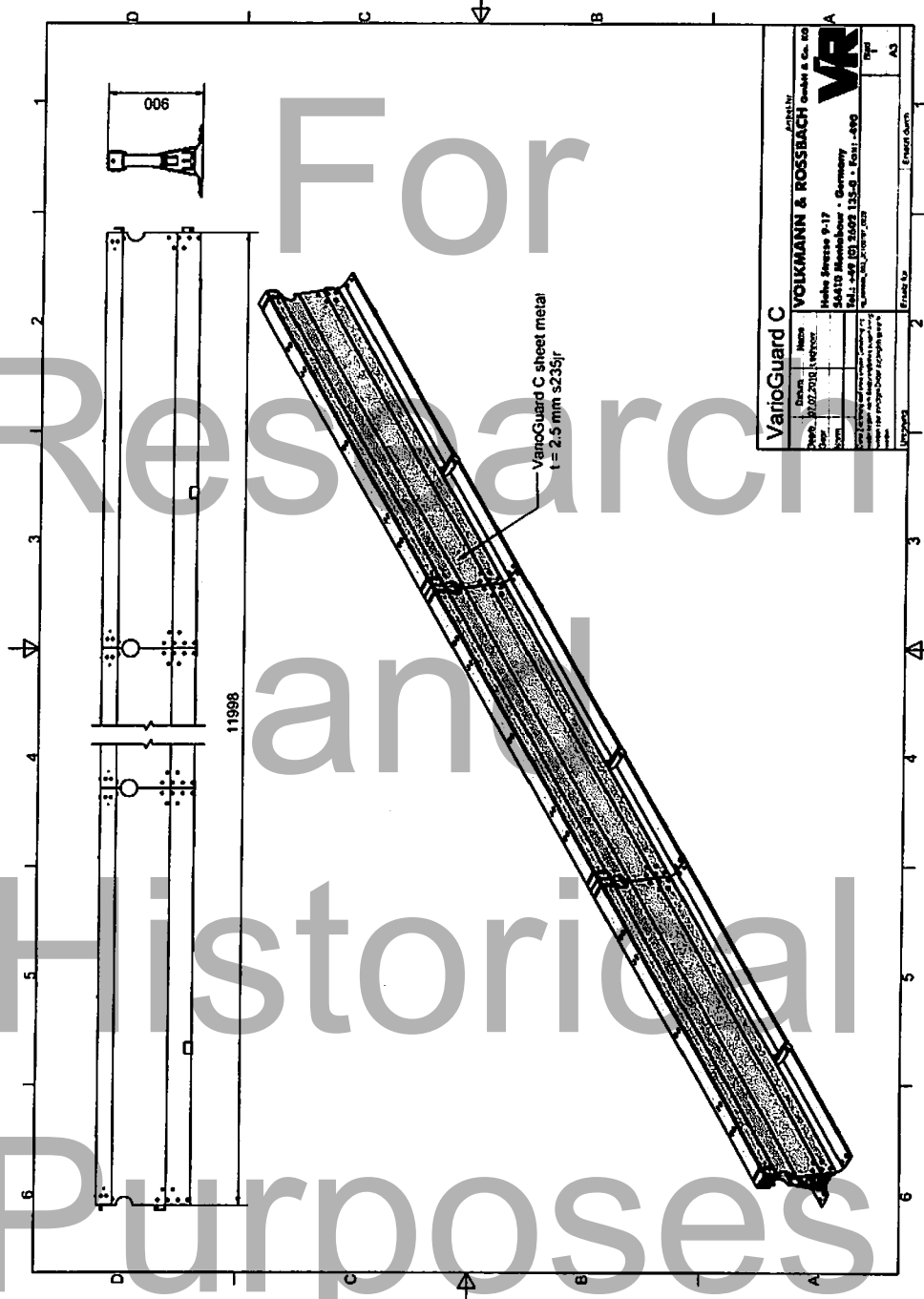
Interior OCDI..... AS0000000

13. Post Impact Vehicle Behaviour (CFC60)

Max Roll Angle (deg)..... -8.7
 Max Pitch Angle (deg)..... 6.8
 Max Yaw Angle (deg)..... 39.1

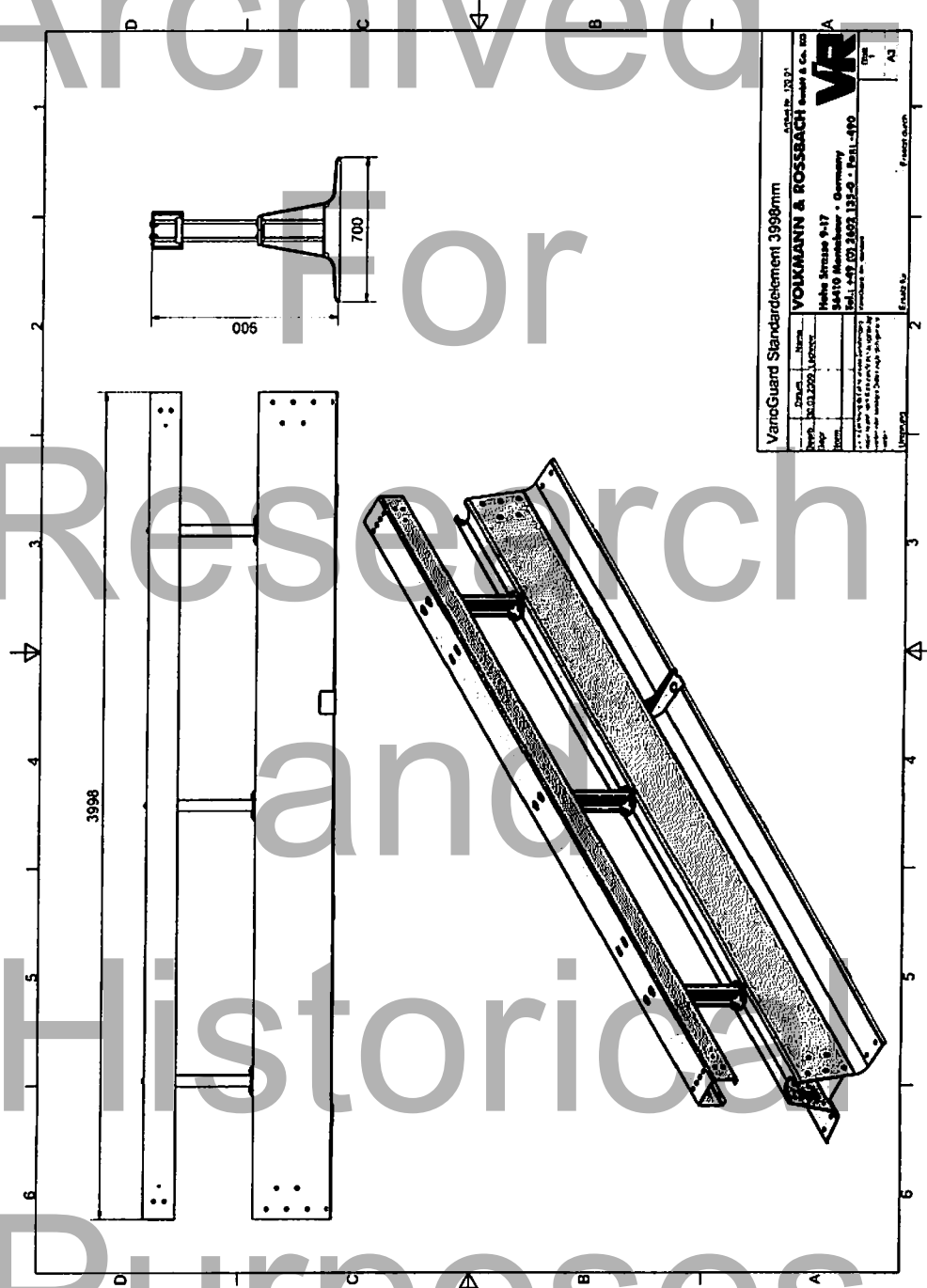
12 DRAWINGS AND INSTALLATION OF THE TEST ITEM

Drawing 1



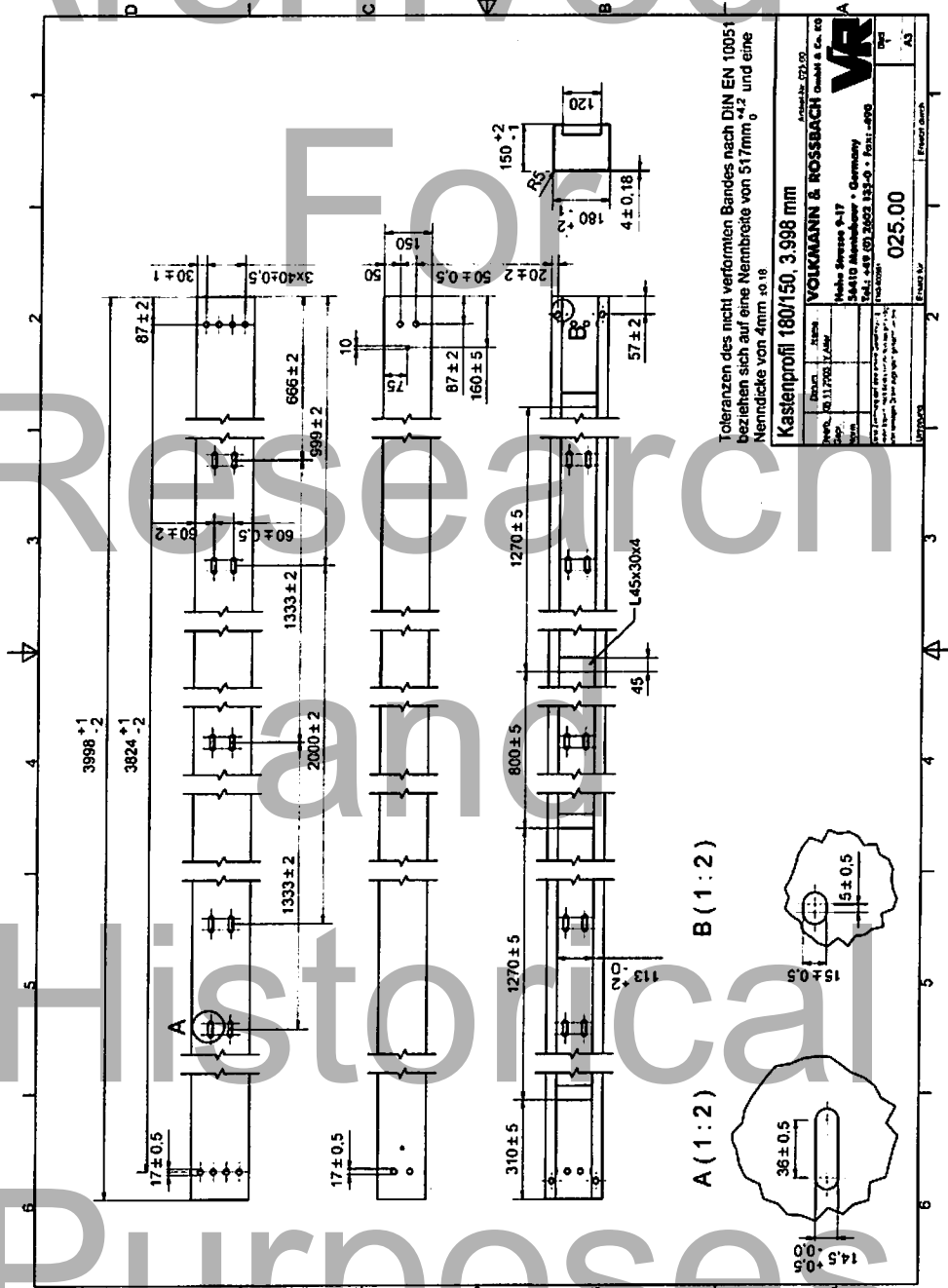


Drawing 3

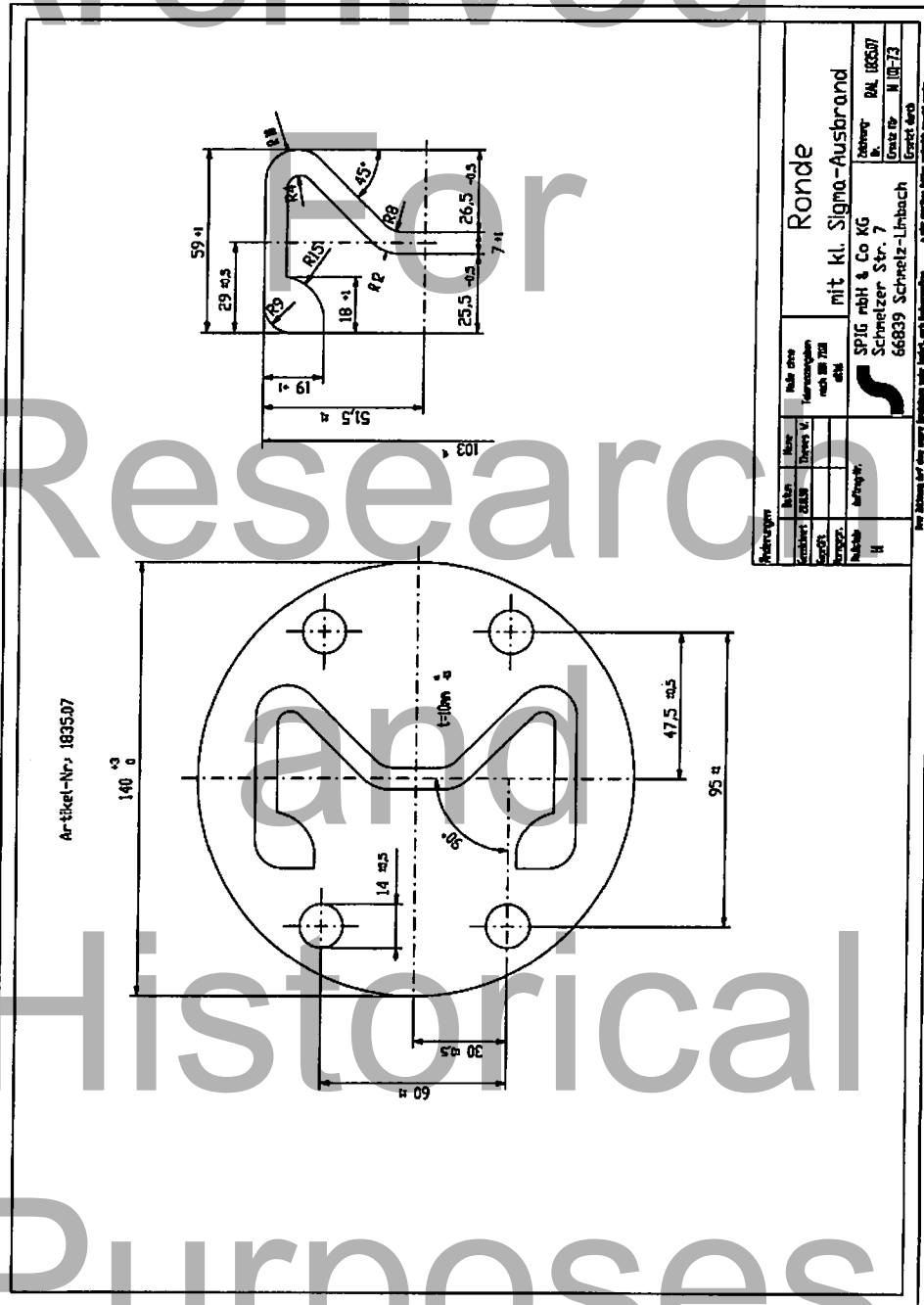




Drawing 5

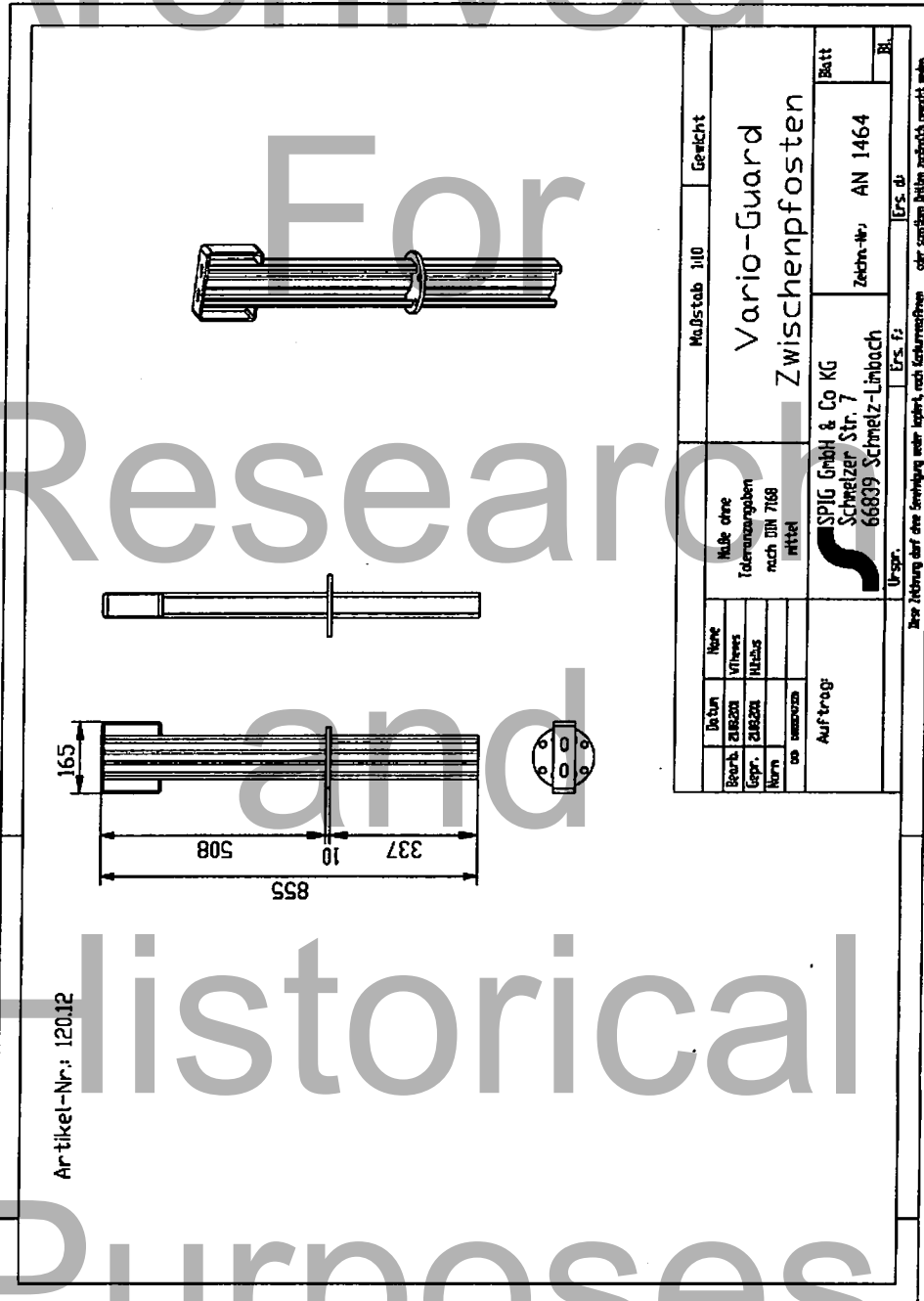


Drawing 6

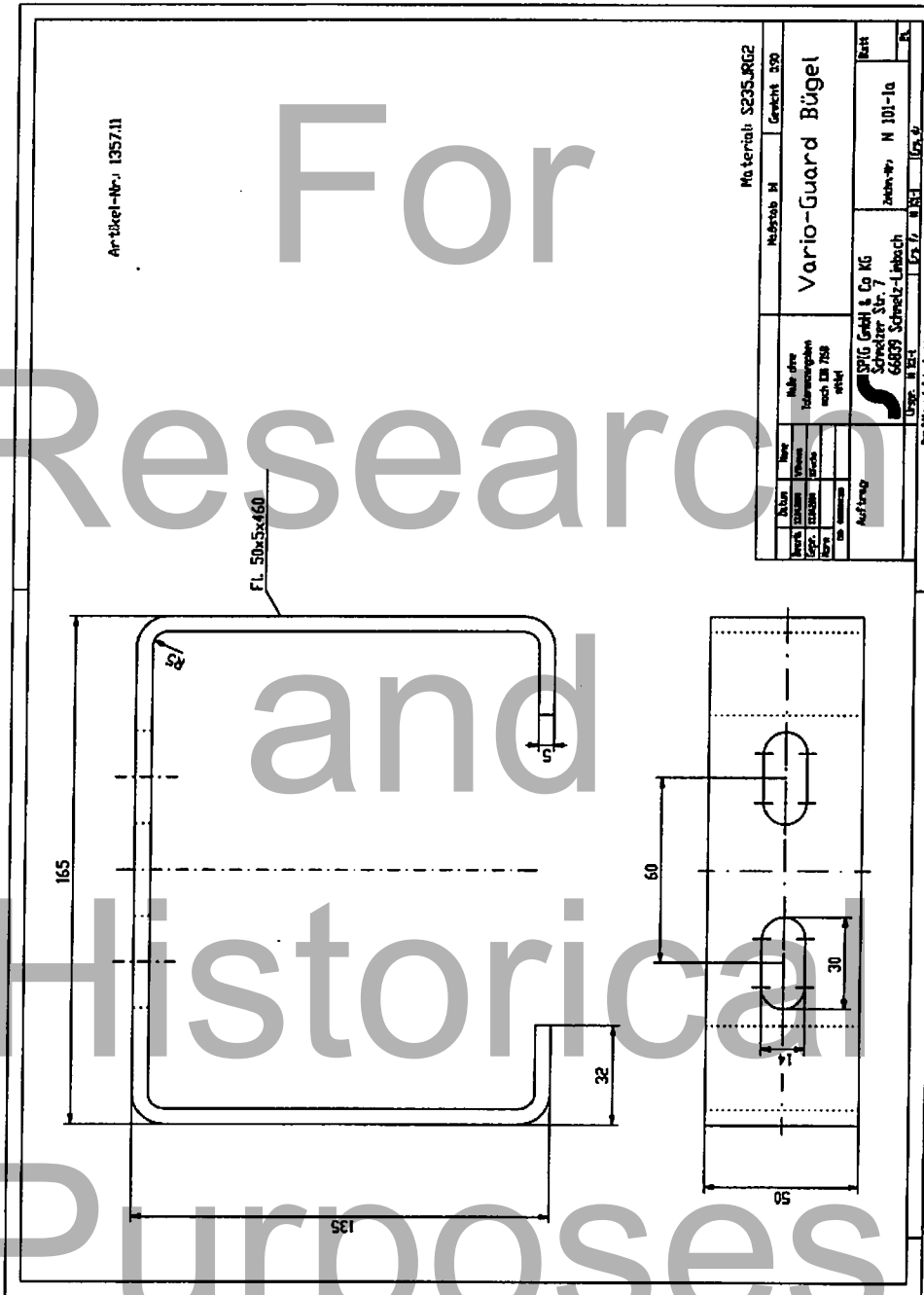




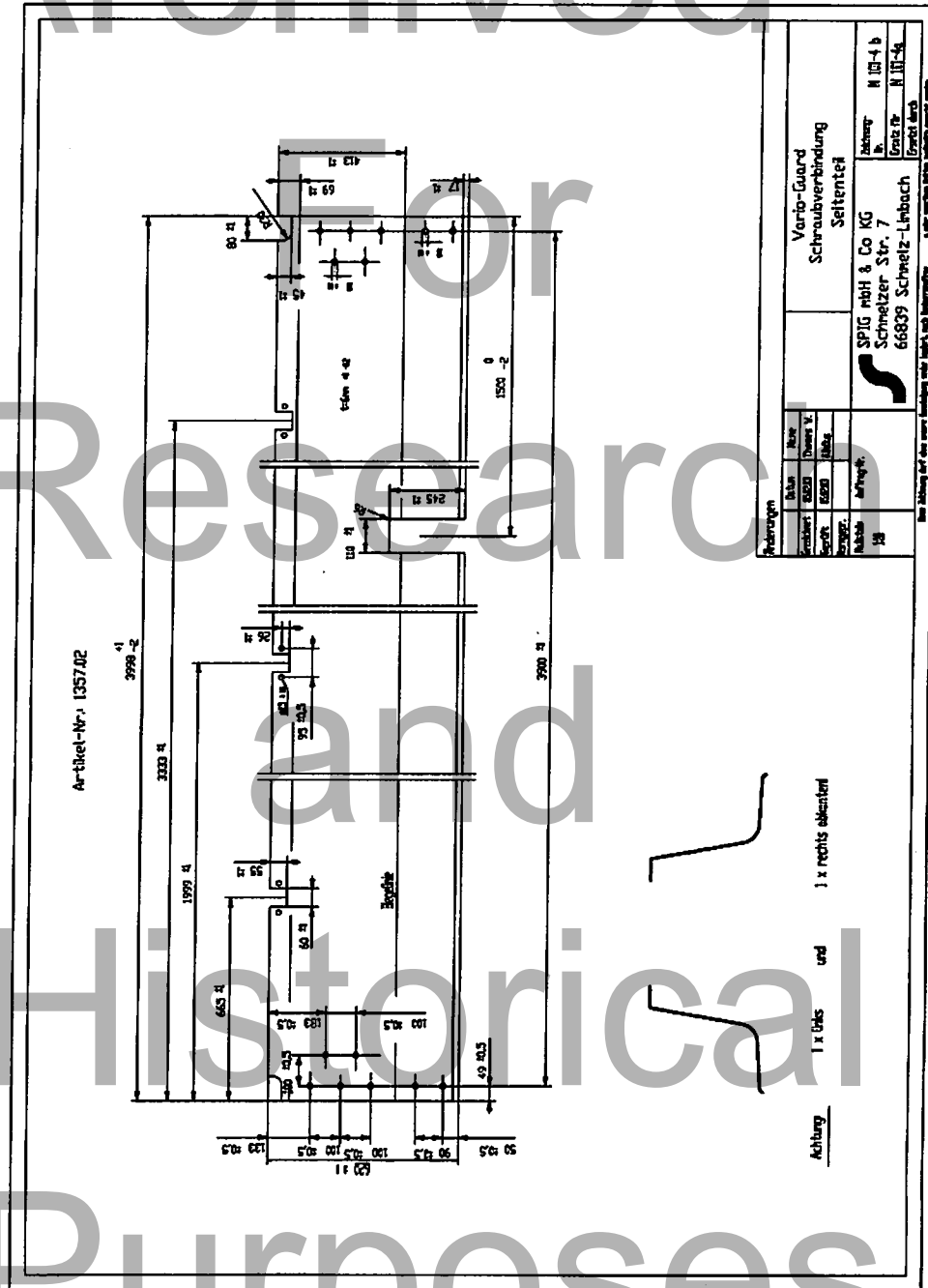
Drawing 8



Drawing 9

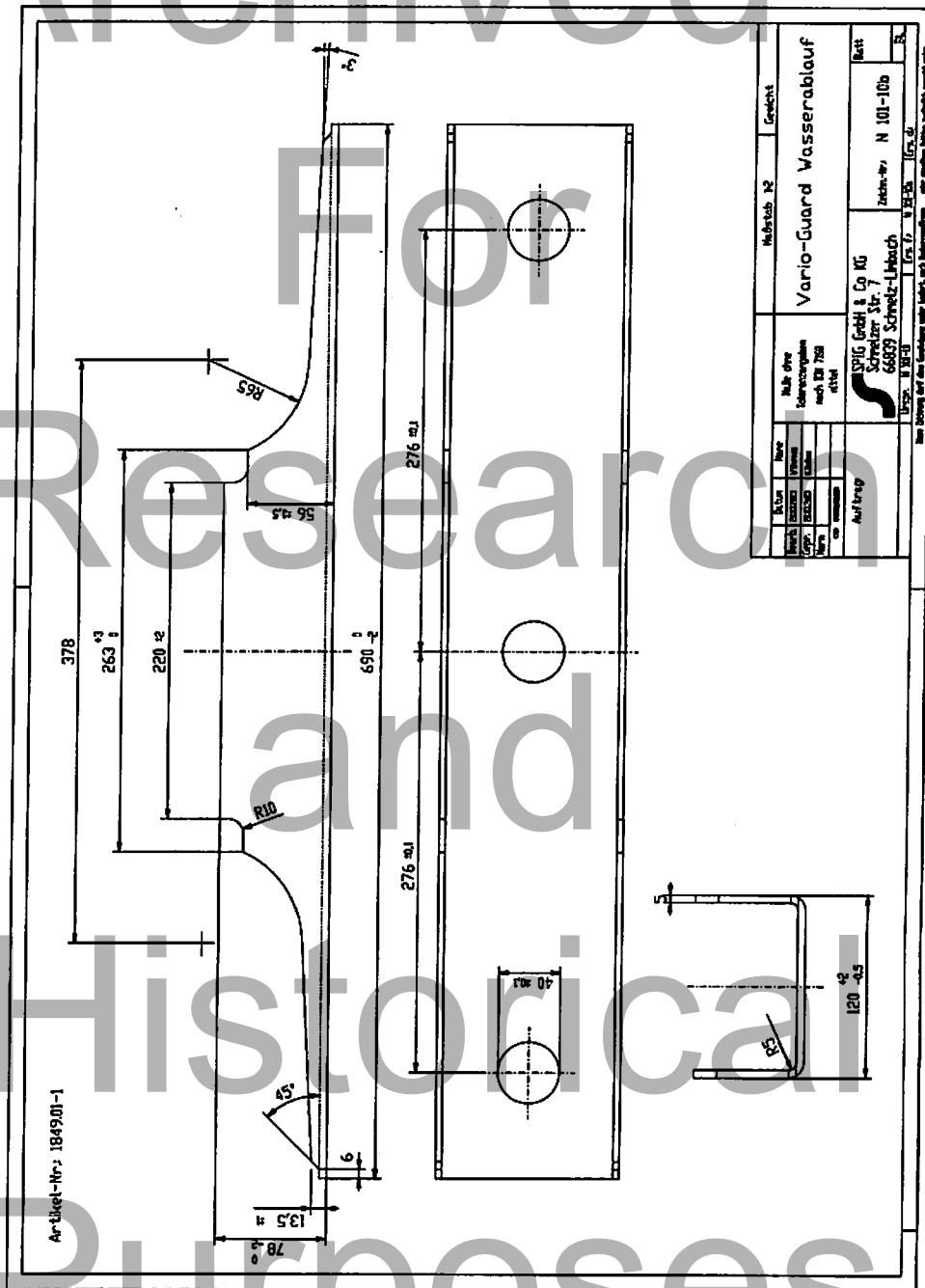


Drawing 10



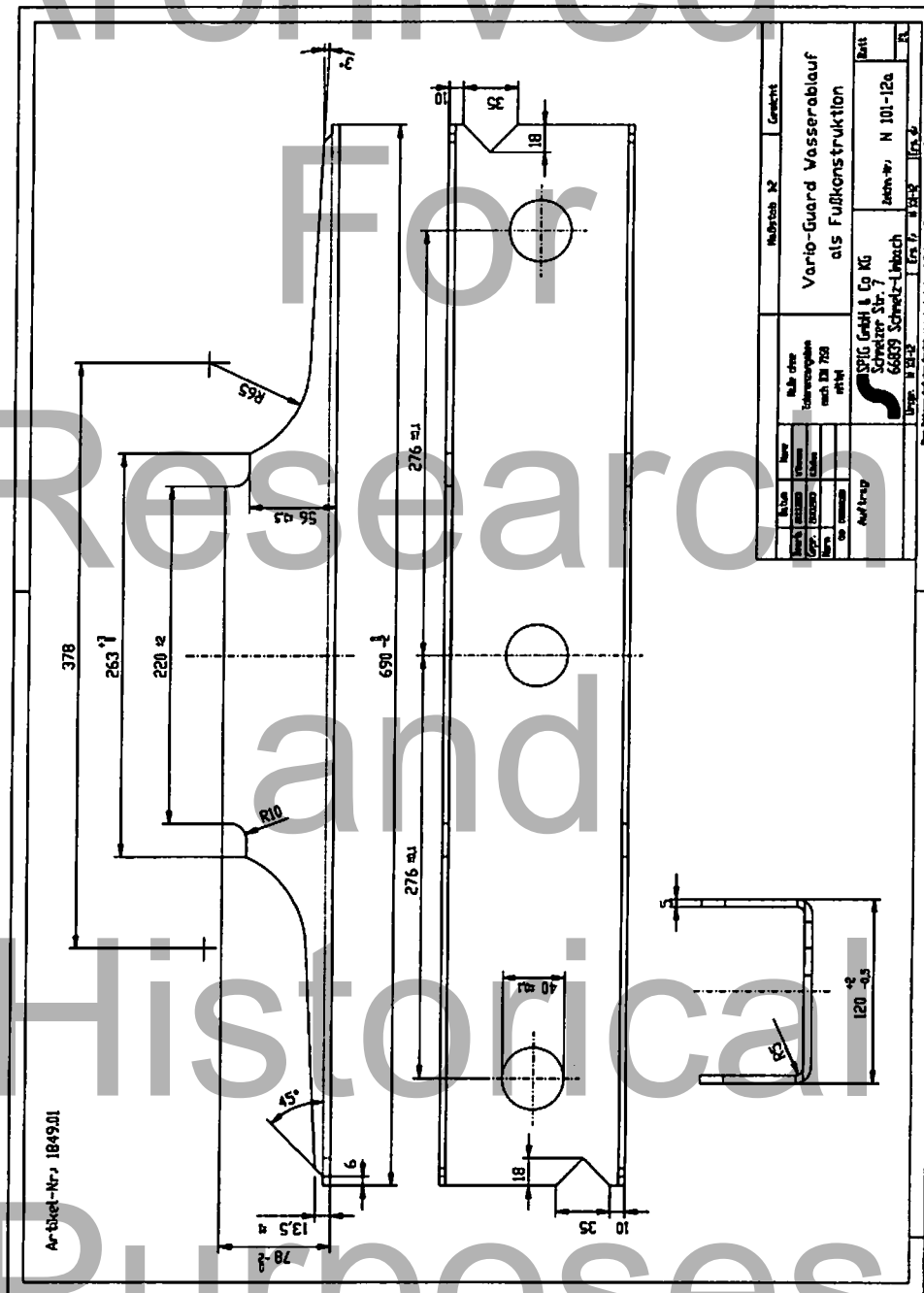


Drawing 12



Auftrag		Mitarbeiter		Gezeichnet	
Zeichner	Prüfer	Zeichner	Prüfer	Gezeichnet	Prüfer
SPING GmbH & Co KG	SPING GmbH & Co KG	SPING GmbH & Co KG	SPING GmbH & Co KG	SPING GmbH & Co KG	SPING GmbH & Co KG
Schneider Str. 7	Schneider Str. 7	Schneider Str. 7	Schneider Str. 7	Schneider Str. 7	Schneider Str. 7
66879 Schwanau	66879 Schwanau	66879 Schwanau	66879 Schwanau	66879 Schwanau	66879 Schwanau
Telefon	Telefon	Telefon	Telefon	Telefon	Telefon
Fax	Fax	Fax	Fax	Fax	Fax
E-Mail	E-Mail	E-Mail	E-Mail	E-Mail	E-Mail
Internet	Internet	Internet	Internet	Internet	Internet
Vario-Guard Wasserablauf Zeichner-Nr. N 101-10b Blatt					

Drawing 13



Drawing 14

