

**Client** Wohner Italia S.r.l. – Milano (Italy)

**Tested equipment** Bar system for low-voltage switchgear and controlgear assembly

**Tests carried out** Verification of the short-circuit withstand strength of the main circuits  
Verification of the effectiveness of the protective circuit:  
- verification of the short-circuit withstand strength of the protective circuit

**Standards/Specifications** Client's requests based on CEI EN 60439-1 (2000-11) Standard

**Test date** from August 2, 2004 to August 2, 2004

The results reported in this document relate only to the tested equipment.  
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**No. of pages** 14 **No. of pages annexed** 5

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**CESI**  
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO  
Business Unit  
Prove e Componenti  
Il Responsabile del Laboratorio



**Tests witnessed by**

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Wohner Italia  
ETA  
ETA  
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**Identification of the object** effected

The Manufacturer guarantees that the tested object is manufactured according to the submitted drawings. CESI checked that these drawings adequately represent in shape and dimensions the essential details and the parts of the tested object.  
These drawings, identified by CESI and numbered **A4/510743 No. 1 to 10**, have been returned to the Client.

Only for laboratory requirement, in order to reproduce the test conditions, all the laboratory data are contained in the document marked: MP-A4/509340

The measurement uncertainties of the test results reported in this document comply with the following limits:

**voltage :  $\pm 5\%$  ; current :  $\pm 5\%$  ; time :  $\pm 5\%$**

The measurement uncertainties are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95 %) and have to be considered as maximum estimated values referred to that type of measurement.

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**Laboratory information****Receipt date of the sample**

July 21, 2004

**Test location**

CESI – Via Rubattino 54 – Milan

**Activity code**

44299J



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## Rated characteristics of the tested object assigned by the Client

Manufacturer of the bar system	Wohner Italia
Manufacturer of the carpentry	ETA
Operational voltage (Ue)	690 V
Insulation voltage (Ui)	690 V
Frequency	50 Hz

Designation	60 mm system; 320 A
Section of bars	(20x5) mm <sup>2</sup>
Rated current	320 A
Short-time withstand current (Icw) and peak withstand current (Ipk)	20 kA for 1 s – 41 kA

Designation	60 mm system; 630 A
Section of bars	(30x10) mm <sup>2</sup>
Rated current	630 A
Short-time withstand current (Icw) and peak withstand current (Ipk)	30 kA for 1 s – 63 kA

Designation	60 mm system; 1600/1250 A
Section of double T bars	(720)/(485) mm <sup>2</sup>
Rated current	1600/1250 A
Short-time withstand current (Icw) and peak withstand current (Ipk)	50 kA for 1 s – 105 kA

Designation	60 mm system; 2500 A
Section of triple T bars	(1140) mm <sup>2</sup>
Rated current	2500 A
Short-time withstand current (Icw) and peak withstand current (Ipk)	50 kA for 1 s – 105 kA
Short-time withstand current (Icw) and peak withstand current (Ipk) of the protective circuit	40 kA for 1 s – 84 kA
Section of the earthing bar	(80x5) mm <sup>2</sup>



**Verification of the short-circuit withstand strength of the main circuits****Test arrangements and test procedure**

The equipment under test was blocked to the floor of the test room as in normal use and appropriately insulated from earth.

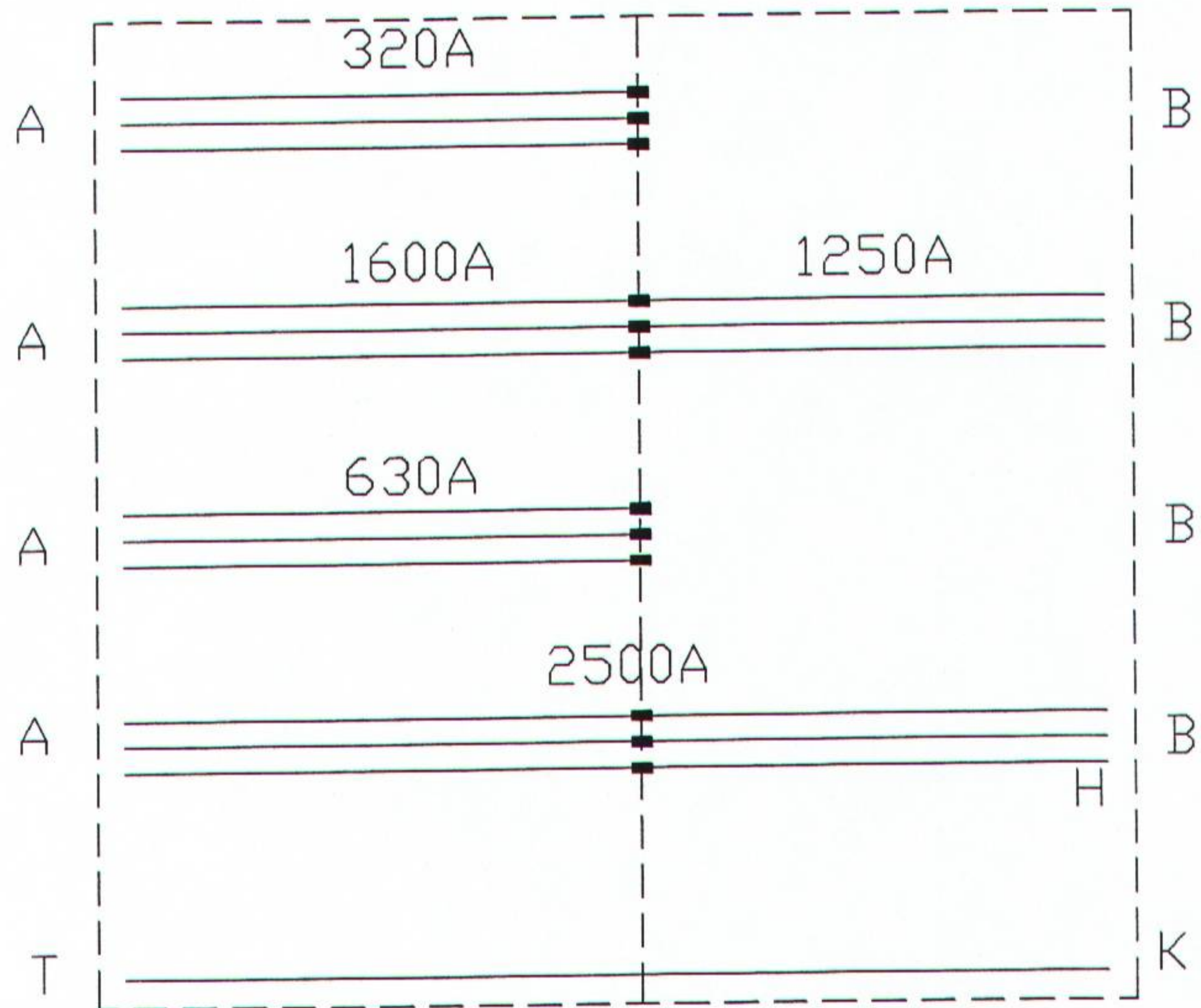
All parts of the equipment intended to be connected to the protective conductor in service, including the enclosure, were connected to the neutral point of supply through a fault current detection device consisting of a fuse of copper wire (of 0,8 mm diameter and about 50 mm in length) connected in series with a resistor, in order to limit the prospective fault current to about 1500 A.

The three-phase tests were performed supplying the terminals of the incoming circuit (point "A" of the test configuration M8000) by one copper tube per-phase having a cross-sectional area of 700 mm<sup>2</sup>; these conductors were firmly blocked together at a distance of about 30 cm from the incoming terminals of the equipment under test.



## Connection points for short-circuit tests

### Test configuration M8000





## Short-circuit tests results with three-phase current

Test circuit: M0007  
 Test configuration: M8000  
 Reference number of the oscillograms: A4/509340

Date: August 2, 2004

Test	Test configuration		Bar system under test	Type of test	Oscillogram	Peak value	Test current		$I^2t$	Duration	Frequency			Notes
	M8000 supply	short-circuit					r.m.s. value	Average value						
No.	point	point	-	-	No./sheets	A	A	A	MA <sup>2</sup> s	s	Hz			(*)
1	A	B	630	dynamic/-thermal	4/1	66070	30520 30780 30650	30650	-	1,0	50			a b c
2	A	B	1600/1250A	dynamic/-thermal	7/1	105520	49990 51810 50560	50790	-	1,0	50			a b c
3	A	B	2500A	dynamic/-thermal	10/1	105530	49520 50560 49920	50000	-	1,0	50			a b c
5	A	B	320A	dynamic/-thermal	13/1	42840	19880 20200 19980	20020	-	1,0	50			a b c

Conditions of the assembly after the tests: see notes

(\*) Notes: a = the fault current detection device did not melt  
 b = the bars and the enclosure did not show any deformation  
 c = the insulation of the conductors and the supporting insulating parts did not show any significant sign of deterioration



## Verification of the effectiveness of the protective circuit

## Verification of the short-circuit strength of the protective circuit

### - Test arrangements and test procedure

The equipment under test was blocked to the floor of the test room as in normal use and appropriately insulated from earth.

The tests were performed connecting a single-phase test supply between the incoming terminal of one phase and the terminal for the incoming protective conductor (points "A" and "T" of the test configuration M8000).

The short-circuit connection between one phase of the main circuits and the protective circuit was made by a copper bar bolted between the lower end of the distribution busbar and the end of the protective conductor (points "H" and "K").



Short-circuit tests results with single-phase current

Test circuit: M0008  
Test configuration: M8000  
Reference number of the oscillograms: A4/509340

Date: August 2, 2004

Test	Test configuration		Circuit under test	Type of test	Oscillogram	Test current		I <sup>2</sup> t	Duration	Frequency			Notes
	supply	short-circuit				Peak value	r.m.s. value						
No.	point	point	-	-	No./sheets	A	A	MA <sup>2</sup> s	s	Hz			(*)
4	A T	H K	protective	dyn./therm.	12/1	84270	40150	-	1,0	50			a b c

Conditions of the assembly after the tests: see notes

(\*) Notes:    a    =    the bars and the enclosure did not show any deformation  
                  b    =    the insulation of the conductors and the supporting insulating parts did not show any significant sign of deterioration  
                  c    =    the electrical continuity of the protective circuit was not impaired by the tests