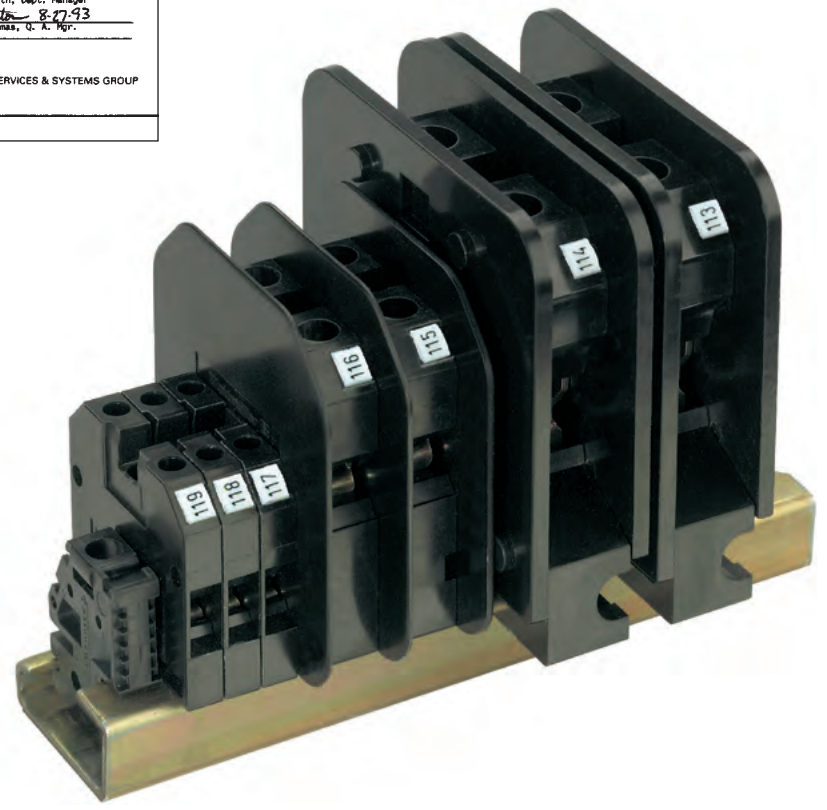
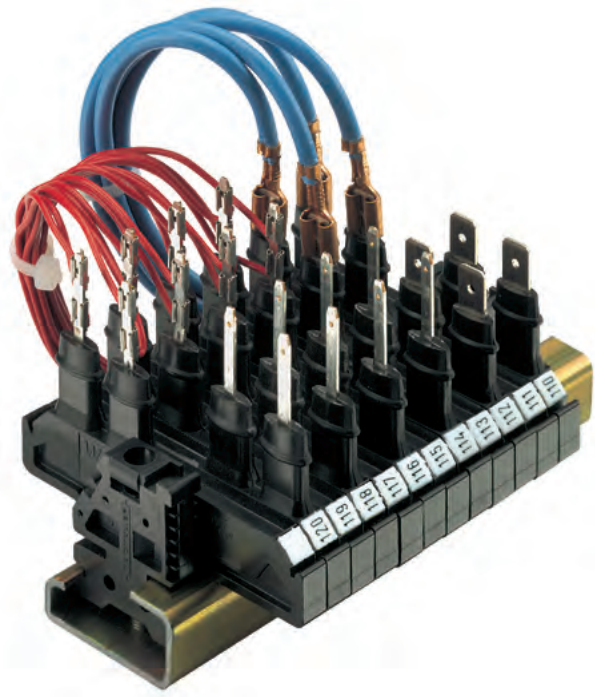


Terminal Blocks for the Containment Areas of Nuclear Power Generating Stations

D

NEQ <small>Nuclear Environmental Qualification</small>	
Test Report	
REPORT NO. <u>42542-1</u>	REVISION <u>B</u>
WYLE JOB NO. <u>42542</u>	
CUSTOMER <u>92.8048/999/QW</u>	
P. O. NO. _____	
PAGE 1 OF <u>1317</u>	PAGE REPORT <u>A</u>
DATE <u>August 26, 1993</u>	
SPECIFICATION (S) <u>See references</u>	
<u>in Paragraph 5.0</u>	
<hr/>	
1.0 CUSTOMER <u>Weidmüller</u>	
ADDRESS <u>Klingenbergstraße 16, Postfach 3030, 5940 Detmold, Germany</u>	
2.0 TEST SPECIMEN <u>Terminal Blocks</u>	
<hr/>	
3.0 MANUFACTURER <u>Weidmüller</u>	
4.0 SUMMARY	
<p>A Nuclear Environmental Qualification Test Program was performed on 67 test groups of various Weidmüller terminal blocks in accordance with Wyle Laboratories Nuclear Environmental Qualification Plan, 42541-00, Revision A. The test program was performed October 2, 1992 through June 25, 1993.</p>	
(1ka)	
<p>STATE OF ALABAMA } Alabama Professional COUNTY OF MADISON } Engineer Reg. No. 16011</p> <p><u>Joseph T. Hazelton, P.E.</u>, being duly sworn, deposes and says: The information contained in this report is the result of complete and careful inspection and tests and is to the best of his knowledge true and correct in all respects.</p> <p>SUBSCRIBED and sworn to before me this <u>21st</u> day of <u>August</u>, 19<u>93</u> <u>Joseph T. Hazelton</u> Notary Public in and for the State of Alabama at large. My Commission expires <u>September 7</u>, 19<u>93</u></p>	<p>Wyle shall have no liability for damages of any kind to person or property, including negligence or consequential damages, resulting from Wyle's providing the services covered by this report.</p> <p>PREPARED BY <u>R.W. Young</u> <u>8/25/93</u> P. McLaughlin, Project Engineer</p> <p>APPROVED BY <u>D. E. Smith</u> <u>8/25/93</u> D. E. Smith, Dept. Manager</p> <p>WYLE Q. A. <u>R. G. Thomas</u> <u>8-27-93</u> R. G. Thomas, U. A. Mgr.</p> <p>WYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP HUNTSVILLE, ALABAMA</p>



Weidmüller

High standards are set for products used in containment areas of nuclear power generating stations. Years of radioactive radiation must not lead to failure. Signals must be transmitted faultlessly in the case of accidents, for example, steam escaping after a coolant pipe burst.

In particular, steam enveloping the terminal blocks could lead to problems. Unsuitable terminal blocks cause leakage currents, which lead to signal distortions. That is why only products which have been approved in accordance with IEEE Class 1 E are allowed to be installed in containment areas.

The special feature of the tests carried out using Weidmüller's terminal blocks is that not only was the insulation resistance measured following an accident simulation, but that the leakage current was recorded during the LOCA test (Loss of Coolant Accident).

Weidmüller also offers for these applications a choice of products made from the special epoxy resin material EP with inorganic filler, which meets the demands for high standards.

The comprehensive test results produced by the Wyle Laboratories enable the regulatory body to judge Weidmüller's products for containment areas Class 1 E (accident simulation test profile 4) and for general use (accident simulation test profile 1) in nuclear generating stations.

- Basis:** **IEEE 323 – 1983**
 "Qualifying class 1 E Equipment for Nuclear Power Generating Stations"
IEE 344 – 1987
 "Recommended Practices for Seismic Qualification of Class 1 E Equipment for Nuclear Power Generating Stations"
Agency: Wyle Laboratories, Huntsville, Alabama, USA
Period: 1992 – 1993

The basis for the qualification statement are the standards laid down in the IEEE that comprise the following product cycles:

1. Functional Test/Initial Values

- Insulation resistance
- Volume resistances

2. Radioactive Aging

- Total dose: 220 Mrad
- Dose rate: 1 Mrad/h
- Volume resistance after contamination

3. Thermal aging equivalent to 40 years of operation at ambient temperature

- 32 °C = 90 °F outside of containment area
- 65 °C = 150 °F within the containment area
- Accelerated aging
- Insulation resistance after contamination

4. Earthquake Simulation

- 5 OBE, 1 SSE test in 3 axes
- Monitoring of the electrical functions

5. Accident Simulation

- Inside and outside of the containment area
- Monitoring of leakage currents for different applications during the accident simulation
- Insulation resistance after contamination

6. Functional Test/Final Values

- Volume resistance
- Optical inspection

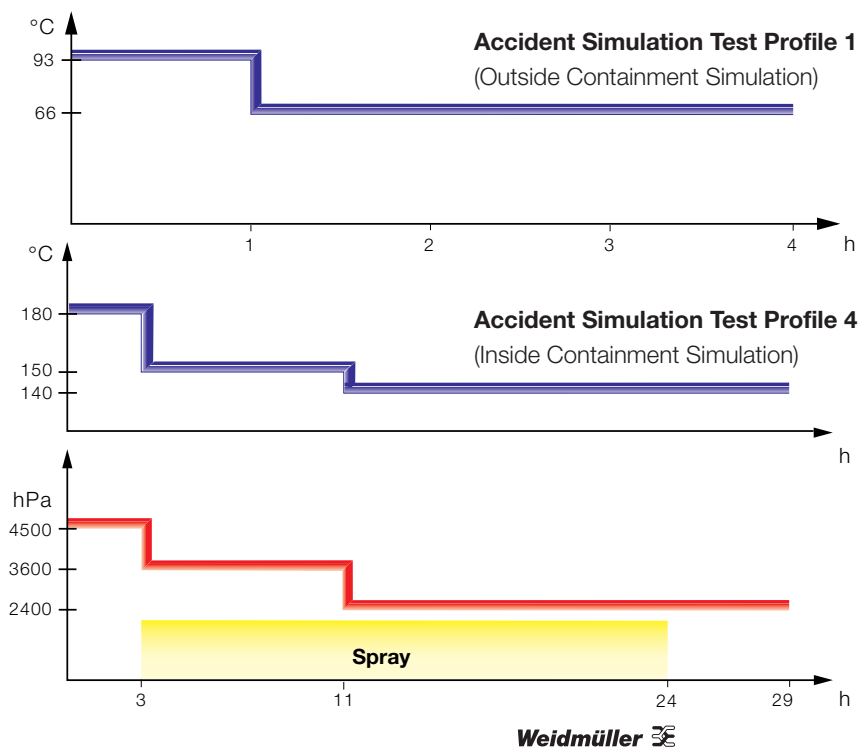
As well as the special terminal blocks for the containment areas, which correspond to the standards according to Class 1 E, Weidmüller has subjected a range of standard terminal blocks to intensive tests in accordance with test profile 1. They all fully meet the demands set for terminal blocks for outside of restricted areas.

Accident Simulation Test Profile 1 Typical PWR Outside Containment Simulation

During the 4-hour test, saturated steam is fed to the temperature control. This simulation is carried out at atmospheric pressure.

Accident Simulation Test Profile 4 Typical PWR Inside Containment Simulation

During the 29-hour test, saturated steam is fed to the temperature control. In the period from the 3rd to 24th hour, the test circuit that is coated with a chemical spray is alternatively coated with a demineralizing spray. This simulation is carried out at an increased pressure of a maximum of 4500 hPa (4.5 bar).



Modular terminals for nuclear power stations

TS 32 / EP

In hazardous area applications, the installation instructions and the rated data specifications for accessories given in the technical appendix must be followed.

Width/Length/height with TS35x7.5	mm
max. current / max. cond. cross-section	A/mm ²
Max. clamping range	mm ²


Technical data

Rated data	
Rated voltage	V
Rated current	A
Rated cross-section	mm ²
Rated impulse voltage / Pollution severity	kV/-
Gauge to IEC 60947-1 / UL94 Flammability class	
Approvals	
Clamped conductors (H05V/H07V)	
solid / stranded	mm ²
flexible / Stranded wire with end ferrules	mm ²
Tightening torque range (clamping screw)	
Stripping length / Blade size	mm/-
Note	

Ordering data

Version	
	black
	Black
Note	

Accessories

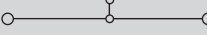
Screwable cross-connection	
	2-pole
	3-pole
	4-pole
	10-pole
Testing / Checking	
	Test plug
	Socket
End plate / Partition plate	
	black

Marking systems (see assortment in catalogue 7)
 Marking tags
For detailed information on other accessories and applications, refer to the „Accessories“ section

SAKH 4

4 mm²



6.5 x 40 x 51.5	
41 / 6	
0.13...6	

IEC 60947-7-1			
IEC	UL	CSA	EN 60079-7
800			550
32			28
4			4
		8 / 3	
		A4 / V-0	
KEMA 97ATEX1798 U			
Rated connection			
0.5...6 / 0.5...4			
0.5...4 / 0.5...4			
0.5...1.0 Nm (M 3)			
12 / 0.6 x 3.5 mm			
When using the twin wire-end ferrules ZH 0.5 - ZH 2.5 without a partition wall, the rated voltage is 690 V.			

Type	Qty.	Order No.
SAK 4 EP/SW	100	0128300000
SAK 4 CUN/EP/SW	100	0168800000


Type	current	Qty.	Order No.
Q 2 SAK4	41 A	50	0336700000
Q 3 SAK4	41 A	50	0336800000
Q 4 SAK4	41 A	50	0336900000
Q 10 SAK4	41 A	20	0368800000
Width			
PS 4 F.STB 4	7.6 mm	20	0299600000
STB 14/D5/2.3/M3 SAK2.5		50	0168600000
Width			
TW SAK4-10 EP/SW	2.5 mm	20	0130100000

DEK 5/5
 End bracket from EP: 0693060000 EWK 1PPS/SW.

SAKH 6

10 mm²



14 x 57 x 76.5	
76 / 16	
0.5...16	

IEC 60947-7-1		
IEC	UL	CSA
1000		
57		
10		
		8 / 3
		B6 / V-0
KEMA 97ATEX1798 U		
Rated connection		
0.5...16 / 0.5...16		
0.5...10 / 0.5...10		
1.2...2.4 Nm (M 4)		
12 / 1.0 x 5.5 mm		
Twin wire-end ferrules ZH 75 - ZH 6 can be used.		

Type	Qty.	Order No.
SAKH 6 EP/SW	50	0126600000

Type	Qty.	Order No.
Width		
AP SAKH6/10 EP/SW	4 mm	20 0131700000

DEK 5/5
 End bracket from EP: 0693060000 EWK 1PPS/SW.

Modular terminals for nuclear power stations

TS 32 / EP

In hazardous area applications, the installation instructions and the rated data specifications for accessories given in the technical appendix must be followed.

Width/Length/height with TS35x7.5	mm
max. current / max. cond. cross-section	A/mm ²
Max. clamping range	mm ²

Technical data

Rated data	
Rated voltage	V
Rated current	A
Rated cross-section	mm ²
Rated impulse voltage / Pollution severity	kV/-
Gauge to IEC 60947-1 / UL94 Flammability class	
Approvals	
Clamped conductors (H05V/H07V)	
solid / stranded	mm ²
flexible / Stranded wire with end ferrules	mm ²
Tightening torque range (clamping screw)	
Stripping length / Blade size	mm/-
Note	

Ordering data

Version
black
Black
Note

Accessories

Screwable cross-connection
2-pole
3-pole
4-pole
10-pole
Testing / Checking
Test plug
Socket
End plate / Partition plate
black

Marking systems	(see assortment in catalogue 7)
	Marking tags
For detailed information on other accessories and applications, refer to the „Accessories“ section	

KMVF LI 6.3 EP/SW

2.5 mm²



IEC	UL	CSA
800		
16		
2.5		
	8 / 3	
	/ V-0	
Rated connection		
0.5...2.5		
0.5...2.5 / 0.5...2.5		
Note		
250 V rated voltage for standard straight alignment and 800 V rated voltage for staggered alignment with alternating KMVF LI and KMVF RE.		

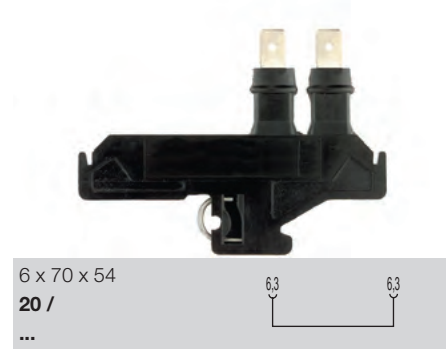
Type	Qty.	Order No.
KMVF LI 6.3 EP/SW	50	0249100000
Note		

Type	Qty.	Order No.

Marking systems	(see assortment in catalogue 7)
	Marking tags
For detailed information on other accessories and applications, refer to the „Accessories“ section	

KMVF RE 6.3 EP/SW

2.5 mm²



IEC	UL	CSA
800		
16		
2.5		
	8 / 3	
	/ V-0	
Rated connection		
0.5...2.5		
0.5...2.5 / 0.5...2.5		
Note		
250 V rated voltage for standard straight alignment and 800 V rated voltage for staggered alignment with alternating KMVF LI and KMVF RE.		

Type	Qty.	Order No.
KMVF RE 6.3 EP/SW	50	0249200000
Note		

Type	Qty.	Order No.

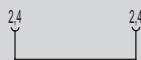
Marking systems	(see assortment in catalogue 7)
	Marking tags
For detailed information on other accessories and applications, refer to the „Accessories“ section	

KMVT LI 2.4 EP/SW

0.5 mm²



6 x 70 x 62
/
...



IEC	UL	CSA
800		
12		
0.5		
	8 / 3	
	/ V-0	
Rated connection		
0.5...2.5		
0.5...2.5 / 0.5...2.5		

250 V rated voltage for standard straight alignment and 800 V rated voltage for staggered alignment with alternating KMVT LI and KMVT RE.

Type	Qty.	Order No.
KMVT LI 2.4 EP/SW	50	0249300000

Type	Qty.	Order No.

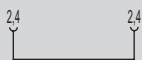
DEK 5/5

KMVT RE 2.4 EP/SW

0.5 mm²



6 x 70 x 62
/
...



IEC	UL	CSA
800		
12		
0.5		
	8 / 3	
	/ V-0	
Rated connection		
0.5...2.5		
0.5...2.5 / 0.5...2.5		

250 V rated voltage for standard straight alignment and 800 V rated voltage for staggered alignment with alternating KMVT LI and KMVT RE.

Type	Qty.	Order No.
KMVT RE 2.4 EP/SW	50	0249400000

Type	Qty.	Order No.

DEK 5/5

PPT/35

6 mm²



15 x 138 x 77
30 / 10
0.5...10



IEC 60947-7-1

IEC	UL	CSA
1500		
30		
6		
	15 / 3	
	/ V-0	
Rated connection		
0.5...10 / 0.5...10		
1.5...6 / 1.5...4		

12 /

Type	Qty.	Order No.
PPT/35	10	3835020000

Type	Qty.	Order No.
Width		
PS 4 F.STB 4	7.6 mm	20 0299600000
STB 17/D6/4/M4 SAKC10		50 0147100000
AP PPT/35	3 mm	10 3835120000

DEK 5/5

The isolating plug (3835360000) may only be pulled out with the removal tool (3835260000). Insulated mounting rail (0514300000).

