




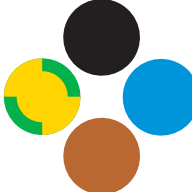

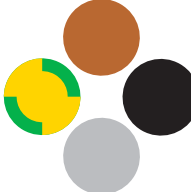
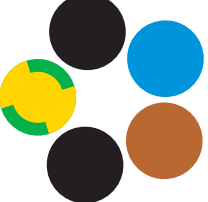
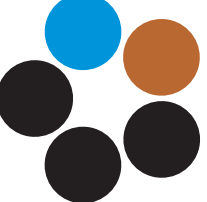





**RHEYHALON® Series 911
Special Navy Cables**

In future will be changed the colour code for power cables type MGSGO and LMGSGO

Existing colour code		Futural colour code		
with gn/ye	without gn/ye	with gn/ye	without gn/ye	
2 cores		2 cores		
3 cores			3 cores	
4 cores			4 cores	
5 cores			5 cores	

Special Cables Marine

Defence- or war-ships are complex platforms with a number of inter-dependent systems and subsystems. As a consequence, the Navy, governmental agencies and system designers have to deal with a large range of variables and parameters; moreover, most of the different military specified variables also have a significant effect on how the system will perform or not.

New designed or midlife converted warships are made-to-order products. This forces the user, the project management and the team of designers to combine and harmonize a large amount of different partly controversial requirements, specified and progressively tightened by naval authorities.

In case of electric/electronic systems on board the overall objective of the work is to intervene the different modules in most cases by cables. All major NATO members independently have tithed rules on Navy cables with respect to toxic and hazardous by-products in case of fire, cross linking, shielding efficiency, cross talk, wire identification etc. Non of the military specifications are the same.

The size and weight optimised Rheyhalon Navy cables, in accordance with VG 95218 part 60 - 66, listed in this catalogue are free of halogens and correspond simultaneously with all requirements of naval ship design and construction rules of the German Navy (BV 3400). Rheyhalon Navy cables are matching and exceeding also international specification requirements of low fire hazard, limited fire hazard and low smoke Navy cables.

From the beginning of the demand for cross-linked, halogen free Navy cables Nexans Deutschland Industries GmbH & Co. KG as predecessor of Alcatel Kabel, Kabel Rheydt and AEG Kabel has been developing, manufacturing and supplying more than 13,000 km of cables according to VG 95218 part 60 (50) through 66 (56) for the German and other navies.

This catalogue seeks to address a solution in a context of concurrent engineering, with active linkage between international design variables and processing Cable parameters.

With this catalogue all other catalogue issues for Navy cables according to VG 95218 invalid.

**List of Reference
RHEYHALON Navy Cables**

Ship type	Quantity	Country
Frigate F122	8	Germany
Frigate MEKO 200 TN	4	Turkey
Frigate MEKO 200 PN	3	Portugal
Frigate MEKO 200 HN	3	Greece
Frigate F123	4	Germany
Frigate F124	3	Germany
Minesweeper SM 343	10	Germany
Minesweeper MJ 332	12	Germany
Serviceboats FD 423	3	Germany
Tender 404	6	Germany
P-Boats P200	4	Brasil
Frigate MEKO 200 TN	2	Turkey
Torpedo Boats	5	Turkey
Torpedo Boats	4	Indonesia
Submarines U 206 A	10	Germany
Submarines	2	Turkey
Submarines SK-Class	9	Korea
Submarines DOLPHIN	3	Israel
Diverse Projects e.g. maintenance		Germany Australia Singapore Thailand India Colombia Chile Greece RSA New Zealand Argentina Peru
Task Force Supply Vessel	2	Germany
Submarines U212	4	Germany
Current Projects		
Submarines U214	4	Greece
Modernisation U209	3	Greece
Submarines U209	3	RSA
Corvettes	4	RSA
Speedboats KILIC II	6	Turkey
Minesweeper MHV	6	Turkey
Submarines U 209	3	Turkey
Frigate F-310	5	Norway
OPV	6	Malaysia
OPV	3	Thailand

Comparison List
old and new discriptions acc. to VG 95218
Navy Cables

type	VG 95218	old discriptions	RHEYHALON- discription acc. to VG 95218
Power - Navy Cables with or without overall screen and defined transfer impedance	part 60	MGCG	MGSGO
Light Power - Navy Cables with overall and defined transfer impedance	part 61	LMKK	LMGSGO
Telecommunication - Navy cables with twisted pairs, overall screen and defined crosstalk attenuation	part 62	LFMKK	FMGSGO
Telecommunication - Navy cables with screened pairs, overall screen and high crosstalk attenuation	part 63	XLFMKK	FMSGSGO
Light Telecommunication - Navy cables with twisted pairs, double overall screen and defined crosstalk attenuation, low transfer impedance	part 64	LSK	LFMGSSGO
Light Telecommunication - Navy cables with screened pairs and overall screen, high crosstalk attenuation and defined transfer impedance	part 65	LSKC	LFMSGSGO
Light Telecommunication - Navy cables with screened triples and double overall screen, high crosstalk attenuation, low transfer impedance	part 66	LSKC	LFMSGSSGO



C E R T I F I C A T E

DQS GmbH

Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

hereby certifies that the company

Nexans Deutschland Industries GmbH & Co. KG Business Group Industrial Applications

Bonnenbroicher Straße 2-14
41238 Mönchengladbach
Germany

for the scope

Design, development, production and sales of wires, strands,
special cables for energy, control and signal transmission

has implemented and maintains a

Quality Management System.

An audit, documented in a report, has verified that this
quality management system fulfills the requirements
of the following standard:

DIN EN ISO 9001 : 2000

December 2000 edition

This certificate is valid until 2005-06-26

Certificate Registration No.: 067944 QM

Frankfurt am Main, Berlin 2003-03-13


Dr.-Ing. K. Petrick

MANAGING DIRECTORS


Dipl.-Ing. S. Heintoth



D-60433 Frankfurt am Main, August-Schanz-Straße 21
D-10787 Berlin, Burggrafenstraße 6



MGGO and MGSGO

acc. to VG 95218 part 60

With or without overall screen and defined transfer impedance, halogenfree, crosslinked

0.6/1 kV



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water.

RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 60

Design

1. Conductor

Bare copper conductor, stranded class 2 or class 5

2. Insulation

Insulation of crosslinked EPR

3. Filling compound

4. Screen (not type MGGO)

Bare copper wire braided screen, separator tape (optional)

5. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

1-core cable	black
2-core cable	black-blue
3-core cable	black-blue-brown
4-core cable	black-blue-brown-black

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9254 RHEYHALON-Series 911 VG 95218 T060 A002 MGSGO 1x6 0.6/1 kV

MGGO and MGSGO 0.6/1 kV acc. to VG 95218 part 60

Nomenclature acc. VG 95218 Part 60 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A001	1x4	2.7	1.0	1.0	7.5	8.5	150	80
A002	1x6	3.3	1.0	1.0	8.4	9.4	180	85
A003	1x10	4.2	1.0	1.1	9.5	10.5	240	100
A004	1x16	5.3	1.0	1.1	10.0	11.0	255	120
A005	1x25	6.6	1.2	1.2	12.0	13.0	415	150
A006	1x35	7.9	1.2	1.2	13.0	14.0	525	195
A007	1x50	9.1	1.4	1.3	15.0	16.0	675	225
A008	1x70	11.0	1.4	1.3	17.0	18.0	885	295
A009	1x95	12.9	1.6	1.4	19.5	20.5	1,190	350
A010	1x120	14.5	1.6	1.4	21.0	22.4	1,330	400
A011	1x150	16.2	1.8	1.5	23.0	24.4	1,760	460
A012	1x185	18.0	2.0	1.6	25.5	27.0	2,170	520
A013	1x240	20.6	2.2	1.7	29.0	30.5	2,600	620
A014	1x300	23.1	2.4	1.8	31.5	33.5	3,240	690
A015	1x185 rf ²⁾	18.1	2.0	1.6	26.2	27.7	2,192	520
*	1x95 rf	12.7	1.6	1.4	20.2	22.5	1,160	350
*	1x240 rf	20.3	2.2	1.7	29.6	31.6	2,700	620
B001	2x1.5	1.7	1.0	1.2	11.5	12.5	238	30
B002	2x2.5	2.2	1.0	1.2	12.4	13.4	284	35
B003	2x4	2.7	1.0	1.2	13.4	14.7	340	40
B004	2x6	3.3	1.0	1.3	14.7	16.0	436	55
B005	2x10	4.2	1.0	1.3	16.2	17.7	565	75
B006	2x16	5.3	1.0	1.4	19.0	20.3	776	95
B007	2x25	6.6	1.2	1.5	22.5	24.0	1,063	125
B008	3x1.5	1.7	1.0	1.2	12.0	13.0	255	25
B009	3x2.5	2.2	1.0	1.2	13.0	14.2	321	29
B010	3x4	2.7	1.0	1.2	14.0	15.2	414	35
B011	3x6	3.3	1.0	1.3	15.5	16.8	526	45
B012	3x10	4.2	1.0	1.4	17.6	18.9	730	65
B013	3x16	5.3	1.0	1.4	20.0	21.4	1,080	90
B014	3x25	6.6	1.0	1.6	24.0	25.4	1,330	120
B015	3x35	7.9	1.0	1.7	26.0	28.2	1,780	145
B016	3x50	9.1	1.0	1.8	30.0	32.2	2,180	180
B017	3x70	11.0	1.2	1.9	34.5	36.7	2,985	225
B018	3x95	12.9	1.2	2.1	39.7	42.2	4,210	280
B019	3x120	14.5	1.2	2.2	43.0	45.7	5,080	320
B020	4x4	2.7	1.0	1.3	15.2	16.5	470	35 ³⁾
B021	4x6	3.3	1.0	1.3	17.0	18.3	660	45 ³⁾
B022	4x10	4.2	1.0	1.4	19.4	20.9	900	65 ³⁾
B023	4x16	5.3	1.0	1.5	22.0	23.5	1,150	90 ³⁾
B024	4x25	6.6	1.0	1.7	26.4	28.0	1,670	120 ³⁾
B025	4x35	7.9	1.0	1.8	29.2	31.0	2,155	145 ³⁾
B026	4x50	9.1	1.2	1.9	33.5	35.8	2,755	180 ³⁾
B027	4x70	11.0	1.2	2.1	38.2	40.7	3,740	225 ³⁾
B028	4x95	12.9	1.2	2.3	44.2	46.7	4,980	280 ³⁾

1) Type C = MGGO without screen

2) = flexible design with fine stranded wire conductor (class 5)

3) = only 3 cores loaded, i.e core 4 = earth core

* not VG-types

MGGO and MGSGO to VG 95218 part 60

Nomenclature acc. VG 95218 Part 60 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
B029	19x6 rf ²⁾	3.2	0.7	1.8	29.4	31.2	2,000	20
B030	33x0.75	1.2	0.8	1.4	22.5	24.5	850	7.4
B031	3x95 rf ²⁾	13.0	1.6	2.1	41.6	43.8	4,300	280
*	3x70 rf	10.9	1.4	1.9	34.7	36.7	3,000	225
C001	1x150 ¹⁾	15.5	1.8	1.5	21.5	24.0	1,600	460
C002	1x185 ^{1) 2)}	18.1	2.0	1.6	24.8	26.3	2,192	520

1) Type C = MGGO without screen

2) = flexible design with fine wire conductor (class 5)

3) = only 3 cores loaded, i.e core 4 = earth core

* not VG-types

Electrical and mechanical characteristics

Nominal Voltage	U ₀ /U = 0.6 / 1 kV
Transfer impedance	max. 30 mΩ/m at 10 MHz (Type A and B/MGSGO)
Max. permissible operating voltage	AC 1,200 V DC 1,800 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	
Type A Part-No. A001-A014	5 x outer diameter
Part-No. A015	4 x outer diameter
Type B Part-No. B001-B028, B030	5 x outer diameter
Part-No. B029, B031	4 x outer diameter
Type C Part-No. C001	5 x outer diameter
Part-No. C002	4 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factors have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

LMGSGO

acc. to VG 95218 part 61

With overall screen and defined transfer resistance, halogenfree, crosslinked

500/500 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy. These cables are not intended for permanent installation in water.

RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for the Construction of German Navy vessels“) for light power degaussing- and Navy cables with improved characteristics in case of fire.

Standards

VG 95218 part 61

Design

1. Conductor

Bare copper conductor, stranded class 2

2. Insulation

Insulation of crosslinked HEPR

3. Screen

Bare copper wire braided screen, separator tape (optional)

4. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

1-core cable	black
2-core cable	black-blue
3-core cable	black-blue-brown
4-core cable	black-blue-brown-black
5 to 37-core cable	sequential numbered beginning with NR 1 from inside to outside

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9255 RHEYHALON-Series 911 VG 95218 T061 A001 LMGSGO 2x1.5 500/500 V

LMGSGO 500 V acc. to VG 95218 part 61

Nomenclature acc. VG 95218 Part 61 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A001	2x1.5	1.7	0.4	0.8	7.0	7.8	95	20
A002	3x1.5	1.7	0.4	0.8	7.2	8.2	115	15
A102	3G1.5 ²⁾	1.7	0.4	0.8	7.2	8.2	115	20
A003	4x1.5	1.7	0.4	0.8	7.8	9.2	140	13
A004	5x1.5	1.7	0.4	0.8	8.3	9.3	160	13
A104	5G1.5 ²⁾	1.7	0.4	0.8	8.3	9.3	160	13
A005	7x1.5	1.7	0.4	1.0	9.3	10.3	210	12
A105	7G1.5 ²⁾	1.7	0.4	1.0	9.3	10.3	210	12
A006	10x1.5	1.7	0.4	1.0	10.8	12.2	280	11
A106	10G1.5 ²⁾	1.7	0.4	1.0	10.8	12.2	280	11
A007	12x1.5	1.7	0.4	1.0	12.0	13.3	315	10
A008	14x1.5	1.7	0.4	1.0	12.7	14.0	373	10
A009	16x1.5	1.7	0.4	1.0	13.2	14.6	395	9
A010	19x1.5	1.7	0.4	1.0	13.9	14.7	470	8
A011	24x1.5	1.7	0.4	1.0	15.5	17.2	590	8
A012	27x1.5	1.7	0.4	1.0	16.6	18.1	640	7
A013	33x1.5	1.7	0.4	1.0	17.5	19.5	785	7
A018	37x1.5	1.7	0.4	1.0	20.0	22.0	860	25
A014	2x2.5	2.2	0.4	0.8	7.7	8.6	125	20
A015	3x2.5	2.2	0.4	0.8	8.0	9.2	148	25
A115	3G2.5	2.2	0.4	0.8	8.0	9.2	148	25
A016	4x2.5	2.2	0.4	0.8	8.7	10.2	195	15
A017	7x2.5	2.2	0.4	1.0	10.3	11.7	290	11

2) = G type with green-yellow core

Electrical and mechanical characteristics

Nominal Voltage	U ₀ /U = 500 / 500 V
Transfer impedance	max. 30 mΩ/m at 10 MHz
Max. permissible operating voltage	AC 550 V DC 825 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factors have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

FMGSGO

acc. to VG 95218 part 62

With twisted pairs, overall screen and defined crosstalk attenuation, halogenfree, crosslinked

250 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water.

RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 62

Design

1. Conductor

Bare copper conductor, stranded class 2

2. Insulation

Insulation of crosslinked HEPR

3. Overall Screen

Bare copper wire braided screen, separator tape (optional)

4. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

1-pair cable	black
2-pair cable (Quad)	black-blue-grey-brown
4-pair cable	1 st pair black-blue
	2 nd pair black-brown
	3 rd pair black-grey
	4 th pair black-grey
6- to 16 pair cable (3-8 Quads)	each quad black-blue-grey-brown in layers with more than one star quad, two adjacent quads identified
pilot quad	black core with fig. 1
direction quad	black core with fig. 2

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9256 RHEYHALON-Series 911 VG 95218 T062 A001 FMGSGO 2x2x0.75 250 V

FMGSGO 250 V acc. to VG 95218 part 62

Nomenclature acc. VG 95218 Part 62 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A008	1x2x0.75	1.2	0.4	0.8	6.0	7.0	80	10
A001	2x2x0.75	1.2	0.4	0.8	6.7	7.8	95	8
A002	4x2x0.75	1.2	0.4	1.0	9.6	11.0	190	6
A003	6x2x0.75	1.2	0.4	1.0	10.8	12.3	232	5
A004	8x2x0.75	1.2	0.4	1.0	11.9	13.4	290	4
A005	10x2x0.75	1.2	0.4	1.0	13.7	15.2	330	4
A006	14x2x0.75	1.2	0.4	1.0	14.9	16.5	480	3
A007	16x2x0.75	1.2	0.4	1.0	16.1	17.9	520	3

Electrical and mechanical characteristics

Nominal Voltage	250 V
Max. permissible operating voltage	AC 250 V DC 355 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Further electrical features

Operating capacity	max. 250 nF/km at 800 Hz
Transfer impedance	max. 30 mΩ/m at 10 MHz
Coupling resistance	max. 300 mΩ/m at 10 MHz
Characteristic impedance	100 Ω at 1 MHz (standard value)
Crosstalk attenuation	min. 90 dB referred to 50 m, at 10 kHz

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factors have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

FMSGSGO

acc. to VG 95218 part 63

With screened pairs, overall screen and high crosstalk attenuation , halogenfree, crosslinked

250 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water. RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 63

Design

1. Conductor

Bare copper conductor, stranded class 2

2. Insulation

Insulation of crosslinked HEPR

3. Pair Screen

Bare copper wire braided screen, separator tape (optional)

3. Overall Screen

Copper wire braided screen, bare, separator tape

4. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

2-pair cable

1st pair black-blue

2nd pair black-brown

4- to 24 pair cable

1st pair black-blue

2nd pair black-brown (Pilot pair)

3rd to 24th pair black-grey (Direction pair)

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

| NEXANS | D 0768 VDE-Reg.-Nr. 9257 RHEYHALON-Series 911 VG 95218 T063 A001 FMSGSGO 2x2x0.75 250 V

FMSGSGO 250 V acc. to VG 95218 part 63

Nomenclature acc. VG 95218 Part 63 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A001	2x2x0.75	1.2	0.4	0.8	11.1	12.5	220	8
A002	4x2x0.75	1.2	0.4	1.0	12.9	14.5	330	6
A003	7x2x0.75	1.2	0.4	1.0	14.9	16.4	470	5
A004	11x2x0.75	1.2	0.4	1.2	19.6	21.4	700	4
A005	14x2x0.75	1.2	0.4	1.2	20.8	22.8	890	3
A006	19x2x0.75	1.2	0.4	1.4	23.4	25.4	1,120	3
A007	24x2x0.75	1.2	0.4	1.4	26.4	28.4	1,420	2

Electrical and mechanical characteristics

Nominal Voltage	250 V
Max. permissible operating voltage	AC 250 V DC 355 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Further electrical features

Operating capacity	max. 250 nF/km at 800 Hz
Transfer impedance Inner conductor - Pair Screen	max. 50 mΩ/m at 10 MHz
Transfer impedance Inner conductor - Overall Screen	max. 30 mΩ/m at 10 MHz
Characteristic impedance	100 Ω at 1 MHz (standard value)
Crosstalk attenuation	min. 90 dB referred to 50 m, at 10 kHz

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factures have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

LFMGSSGO / LFMGSGO

acc. to VG 95218 part 64

With twisted pairs, single or double overall screen and defined crosstalk attenuation , low transfer impedance, halogenfree, crosslinked

250 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water.

RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 64

Design

1. Conductor

Tinned copper conductor, stranded class 2

2. Insulation

Crosslinked polymer compound

3. Overall screens

Tinned copper wire braided screen, separator tape
two screens electrically separated (type LFMGSSGO – single screen)

4. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

2-pair cable (Quad)	black-blue-grey-brown
4- to 45 pair cable	1 st pair black-blue
	2 nd pair black-brown
	3 rd pair black-grey and other pairs

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9258 RHEYHALON-Series 911 VG 95218 T064 A001 LFMGSSGO 2x2x0,4 250 V

LFMGSGO/LFMGSSGO 250 V acc. to VG 95218 part 64

Nomenclature acc. VG 95218 Part 64 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable-Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A001	2x2x0.4	0.85	0.2	0.8	5.8	6.8	80	5.1
A002	4x2x0.4	0.85	0.2	0.8	7.7	8.8	130	4.0
A003	7x2x0.4	0.85	0.2	0.9	9.4	10.8	210	3.3
A004	12x2x0.4	0.85	0.2	1.0	12.8	14.5	320	2.7
A005	19x2x0.4	0.85	0.2	1.0	13.8	15.5	420	2.3
A006	27x2x0.4	0.85	0.2	1.1	15.5	17.3	511	2.1
B001 ¹⁾	30x2x0.4	0.85	0.2	1.4	17.5	19.3	471	2.0
B002 ¹⁾	45x2x0.4	0.85	0.2	1.6	20.6	22.5	660	2.8
C001 ¹⁾	60x2x0.15	0.55	0.25	1.6	22.4	23.0	767	1.0

1) = Type B and C LFMGSGO type with one overall screen

2) = Type C nominal vpltage 600 V AC

Electrical and mechanical characteristics

Nominal Voltage	250 V
Max. permissible operating voltage	AC 250 V DC 355 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Further electrical features

Operating capacity	max. 120 nF/km at 800 Hz
Transfer impedance	max. 30 mΩ/m at 10 MHz (Type LFMGSGO)
Transfer impedance	max. 15 mΩ/m at 10 MHz (Type LFMGSSGO)
Characteristic impedance	100 Ω at 1 MHz (standard value)
	Z = 82 Ω at 1 MHz (standard value)
Crosstalk attenuation	min. 90 dB referred to 50 m, at 10 kHz

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factures have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

LFMSGSGO

acc. to VG 95218 part 65

With screened pairs or screened quads and overall screen, high crosstalk attenuation, halogenfree crosslinked

250 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water. RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 65

Design

1. Conductor

Tinned copper conductor, stranded class 2

2. Insulation

Insulation of crosslinked polymer compound

3. Pair screen

Tinned copper wire braided screen, separator tape (optional)

4. Screen

Copper wire braided screen, tinned, separator tape (optional)

5. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

2- to 27 pair cable (Type A)

1st pair black-blue (Pilot pair)

2nd pair black-brown (Direction pair)

3rd pair black-grey

and other pairs

Cable with screened quads (Type C)

cores in each quad

1st quad red (Pilot quad)

2nd quad green (Direction quad)

3rd quad natural shade

and other quads

Combination cable (Type B)

1st pair 1,2 mm² with red tape wrapping

2nd pair 1,2 mm² with green tape wrapping

3rd pair 1,2 mm² natural shade

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9259 RHEYHALON-Series 911 VG 95218 T065 A001 LFMSGSGO 2x2x0.4 250 V

LFMSGGO 250 V acc. to VG 95218 part 65

Nomenclature acc. VG 95218 Part 65 Type/Part No.	Number of cores and nominal cross section mm ²	Diameter of conductor nominal mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max. mm		Cable- Weight max. kg/km	Current rating at ambient temperature of 45 °C A
A001	2x2x0.4	0.85	0.2	0.8	9.3	10.5	140	5.1
A002	4x2x0.4	0.85	0.2	0.8	10.0	11.3	195	4.0
A003	7x2x0.4	0.85	0.2	0.9	12.0	13.5	290	3.3
A004	12x2x0.4	0.85	0.2	1.0	15.5	17.0	460	2.7
A005	19x2x0.4	0.85	0.2	1.0	18.4	20.4	650	2.3
A006	27x2x0.4	0.85	0.2	1.1	22.5	24.5	920	2.1
B001	3x2x1.2 + 18x2x0.25	1.5 0.65	0.25 0.2	1.2 1.2	20.0	22.2	750	1.6
C001	27x4x0.25	0.21	0.2	1.2	22.0	26.0	1,000	1.3

Electrical and mechanical characteristics

Nominal Voltage	250 V
Max. permissible operating voltage	AC 250 V DC 355 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Further electrical features

Operating capacity		Transfere impedance	
pairs with 0.25 mm ²	max. 150 nF/km at 800 Hz	inner conductor – overall screen	max. 50 mΩ/m at 10 MHz
pairs with 0.4 mm ²	max. 150 nF/km at 800 Hz	inner conductor/pairscreen – overall screen	max. 30 mΩ/m at 10 MHz
pairs with 1.2 mm ²	max. 180 nF/km at 800 Hz	inner conductor – pairscreen/overall screen	max. 30 mΩ/m at 10 MHz
Characteristic impedance			
pairs with 0.25 mm ²	145 Ω -j 122 Ω at 10 kHz (standard value)		
	Z = 77 Ω at 1 MHz (standard value)		
pairs with 0.4 mm ²	120 Ω -j 95 Ω at 10 kHz (standard value)		
	Z = 72 Ω at 1 MHz (standard value)		
pairs with 1.2 mm ²	145 Ω -j 122 Ω at 10 kHz (standard value)		
	Z = 77 Ω at 1 MHz (standard value)		
quads with 0.25 mm ²	157 Ω -j 103 Ω at 10 kHz (standard value)		
	Z = 103 Ω at 1 MHz (standard value)		
Crosstalk attenuation	min. 100 dB referred to 50 m, at 10 kHz		

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factors have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

LFMSGSSGO

acc. to VG 95218 part 66

With screened triples and double overall screen, high crosstalk attenuation, low transfer impedance, halogenfree, crosslinked

250 V



Max core temperature: 85°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power- and control systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water.

RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Standards

VG 95218 part 66

Design

1. Conductor

Tinned copper conductor, stranded class 2

2. Insulation

Insulation of crosslinked polymer compound

3. Triple screen

Tinned copper wire braided screens, separator tape

4. Overall screens

Copper wire braided screen, tinned, separator tape, two screens electrically separated

5. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Core Identification

in each tripple black-white-grey

in each layer

- | | |
|-------------------------|---------------------------|
| 1 st tripple | red (Pilot tripple) |
| 2 nd tripple | green (Direction tripple) |
| 3 rd tripple | natural shade |
- and other tripple

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 0768 VDE-Reg.-Nr. 9260 RHEYHALON-Series 911 VG 95218 T066 A001 LFMSGSSGO 5x3x0.4 250 V

LFMSGSSGO 250 V acc. to VG 95218 part 66

Nomenclature acc. VG 95218 Part 66	Number of cores and nominal cross section	Diameter of conductor nominal	Wall thickness of insulation nominal	Wall thickness sheath nominal	Outer diameters min./max.		Cable- Weight max.	Current rating at ambient temperature of 45 °C
					mm			
Type/Part No.	mm ²	mm	mm	mm	mm		kg/km	A
A001	5x3x0.4	0.85	0.2	1.0	12.2	13.9	328	3.2
A002	12x3x0.4	0.85	0.2	1.2	16.9	18.9	613	2.4

Electrical and mechanical characteristics

Nominal Voltage	250 V
Max. permissible operating voltage	AC 250 V DC 355 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C

Further electrical features

Operating capacity	max. 150 nF/km at 800 Hz
Transfer impedance	
Inner conductor – tripple screen	max. 50 mΩ/m at 10 MHz
Inner conductor/tripple screen – double overall screen	max. 15 mΩ/m at 10 MHz
Crosstalk attenuation	min. 100 dB referred to 50 m, at 10 kHz

Current rating

The values for current carrying capacity, listed in the tables, correspond to the values in BV 3400 ("Specification for Construction of German Navy vessels"). This values are given for continuous operating and single installation at ambient temperature of 45°C. For higher ambient temperatures, following factures have to be used for calculation:

Ambient temperature:	45°C	Derating factor:	1.0
	50°C		0.93
	55°C		0.86
	60°C		0.79
	65°C		0.70
	70°C		0.61
	75°C		0.50

HXRG

acc. to VG 95218 part 101

Halogenfree, crosslinked



Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® HF-Navy cables are determined for fixed installation in electrical power systems below and above deck, preferably on ships of the German Navy. These cables are not intended for permanent installation in or under water. RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Max core temperature: 85°C

Standards

VG 95218 part 101

Design

1. Conductor

Copper conductor, stranded class 2

2. Dielectrical compound

Insulation of polyethylene

3. Overall screen

Copper wire braided screen, separator tape

4. Outer Sheath

Outer sheath of crosslinked elastomer compound, colour black

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

I NEXANS I D 1427 VDE-Reg.-Nr. 7779 RHEYHALON-Series 911 VG 95218 T101 A002 HXRG 213

HXRG acc. to VG 95218 part 101

Type	Nomenclature acc. VG 95218 part 101	Conductor	Dielectric material mm	Diameter of dielectric nominal	Screen mm	Outer diameter nominal kg/km	Cable-Weight max.
HX RG 11	F001	tinned copper, stranded	PE	7.3	bare copper	10.3	150
HX RG 58	B001	tinned copper, stranded	PE	2.9	tinned copper	5.0	37
HX RG 59	D001	bare copper-clad steel singlewire	PE	3.7	bare copper	6.1	54
HX RG 213	A002	bare copper, stranded	PE	7.3	bare copper	10.3	160
HX RG 214	C002	silver plated copper, stranded	PE	7.3	double silver plated copper screen	10.6	185
HX RG 216	E001	tinned copper, stranded	PE	7.3	double bare copper screen	10.8	176
HX RG 218	A001	bare copper singlewire	PE	17.3	bare copper	22.1	720

Type	Conductor resistance at 20 °C max. Ω/km	Insulation resistance GΩ · km	Capacitance (nominal) pF/m	Characteristic impedance Ω	Velocity ratio (nominal)	Attenuation ca. db/100 m at 200 MHz
HXRG 11	22	10	68	75 ± 3	0.66	12
HXRG 58	41	10	100	50 ± 2	0.66	25
HXRG 59	160	10	68	75 ± 2	0.66	20
HXRG 213	5.8	10	100	50 ± 2	0.66	10
HXRG 214	5.8	10	100	50 ± 2	0.66	11
HXRG 216	22	10	68	75 ± 3	0.66	11
HXRG 218	1.03	10	100	50 ± 2	0.66	6

Other

The electrical characteristics and the dimensions fulfill the requirements of MIL-C-17 (connector-compatibility).
The outer sheath is acc. to VG 95218 parts 60-66 (elongation at break ≥ 125 %).

Operating temperature at conductor	+ 85 °C
Lowest permissible temperature for installation	- 10 °C
Minimum bending radius	fixed installation
	repeatedly bending
	$r = 5 \times D$
	$r = 20 \times D$

Profibus

1 x 2 x AWG 24



Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Profibus-cable is determined for fixed installation on navyships in all rooms, below and on decks for datatechnical networks in control units.

Max core temperature: 85°C

Standards

factory standard

Design

1. Conductor

Copper bare, stranded conductor

2. Insulation

polyethylen, crosslinked by irradiation

3. Overall screen

PETP-Alu-Foil plus braid of tinned copper wires, Ø under screen: approx. 5,4 mm

4. Outer Sheath

halogenfree, crosslinked, sheath flame retardant, low toxicity (Characteristics acc. to VG 95218 T60-66), outer-Ø approx. 10,3 mm

Core Identification

red-green

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

| NEXANS | RHEYHALON-Series 911 Profibus 150 Ω

Profibus 1 x 2 x AWG 24

Electrical and mechanical characteristics

Loop resistance	max. 190 Ω
Characteristic impedance	150 $\Omega \pm 10\%$ (3 to 20 MHz)
Image attenuation constant	max. 5 dB/km (at 38.4 kHz) max. 3 dB/km (at 9.6 kHz)
Mutual capacitance	max. 35 nF/km (at 800 Hz)
Insulation resistance	min. 16 G $\Omega \cdot$ km (at 20 °C)

Temperatures

For installation	-20 °C to +70 °C
At work, fixed installation	-40 °C to +90 °C

Bending radii

Fixed installation	10 x d
Repeatedly bending (d = cable diameter)	20 x d

MGO

acc. to VG 95218 part 20 F
Halogenfree, crosslinked

600 V



Max core temperature: 115°C

Approval/Certificates

For these RHEYHALON® military wires following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance (VDE-Reg.-No. 7765)
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001
- Approval Certificate from "Germanischer Lloyd"

Applications

For inside wiring in switchboards, connecting boxes, control panels etc. on board of navyships.

Standards

VG 95218 part 20 F

Design

1. Conductor

Cu tinned, stranded acc. to DIN VDE 0295 class 6, IEC 228 class 6

2. Insulation

crosslinked special hard grade elastomer compound, halogenfree

Core Identification

white (WH)
Nomenclature last figure ..9
green-yellow (GNYE)
Nomenclature last figure ..G
black (BK)
Nomenclature last figure .. 0
other colours on request

Marking

Marked by printing in contrast-colour on the core and/or on the bobbin

Sample:

I NEXANS I D0768 VDE-Reg.-Nr. 7765 VG 95218 T020F A019 0,75mm² 600 V

Nomenclature acc. VG 95218 part 20 F	Rated cross section nominal value	Conductor diameter nominal value	Overall diameter max.	Weight max. max.	Conductor resistance at 20 °C max.
Type/Part No.	mm ²	mm	mm	kg/km	Ω/km
149	0.5	0.9	2.4	10	40.1
159	0.75	1.1	2.6	13	26.7
169	1	1.3	2.8	14	20
109	1.5	1.6	3.2	22	13.7
119	2.5	2.2	3.7	33	8.21
019	4	2.8	4.3	47	5.09
029	6	3.5	4.9	65	3.39

MGO 600 V acc. to VG 95218 part 20 F

Nomenclature acc. VG 95218 part 20 F	Rated cross section nominal value	Conductor diameter nominal value	Overall diameter max.	Weight max. max.	Conductor resistance at 20 °C max.
Type/Part No.	mm ²	mm	mm	kg/km	Ω/km
039	10	4.5	6.1	115	1.95
049	16	5.3	7.2	180	1.24
059	25	6.8	9.0	265	0.795
069	35	7.8	10.3	366	0.565
079	50	9.5	12.0	500	0.393
089	70	11.3	13.9	705	0.277
099	95	13.3	15.8	1,000	0.21
*	120	15.0	17.6	1,250	0.164
*	150	16.3	19.7	1,500	0.132
*	185	17.7	22.0	1,800	0.108
*	240	20.3	24.8	2,350	0.018
14G	0.5	0.9	2.4	10	40.1
15G	0.75	1.1	2.6	13	26.7
16G	1	1.3	2.8	14	20
10G	1.5	1.7	3.2	22	13.7
11G	2.5	2.2	3.7	33	8.21
01G	4	2.8	4.3	47	5.09
02G	6	3.5	4.9	65	3.39
03G	10	4.5	6.1	115	1.95
04G	16	5.3	7.2	180	1.24
05G	25	6.8	9.0	265	0.795
06G	35	7.8	10.3	366	0.565
07G	50	9.5	12.0	500	0.393
08G	70	11.3	13.9	705	0.277
09G	95	13.3	15.8	1,000	0.21
*	120	15.0	17.6	1,250	0.164
*	150	16.3	19.7	1,500	0.132
*	185	17.7	22.0	1,800	0.108

* not VG-types

Electrical characteristics	
Nominal Voltage	U ₀ /U (U max.) = 0.6/1.0 (1.2) kV
in d.c.-direct current systems; earthed at one end only	1.1 kV
test voltage; 5 minutes	up to 10 mm ² 3.5 kV up to 16 mm ² 4.5 kV

Temperatures	
Conductor at normal operation	≤ 115 °C
Conductor at short circuit (tinned conductors)	≤ 200 °C
Fixed installation	≥ - 40 °C
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ - 40 °C

Bending radii	
Fixed installation	≥ 3 d
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ 5 d
d = cable diameter	

MGO 600 V acc. to VG 95218 part 20 F

Nomenclature acc. VG 95218 part 20 F	Rated cross section nominal value	Conductor diameter nominal value	Overall diameter max.	Weight max. max.	Conductor resistance at 20 °C max.
Type/Part No.	mm ²	mm	mm	kg/km	Ω/km
039	10	4.5	6.1	115	1.95
049	16	5.3	7.2	180	1.24
059	25	6.8	9.0	265	0.795
069	35	7.8	10.3	366	0.565
079	50	9.5	12.0	500	0.393
089	70	11.3	13.9	705	0.277
099	95	13.3	15.8	1,000	0.21
*	120	15.0	17.6	1,250	0.164
*	150	16.3	19.7	1,500	0.132
*	185	17.7	22.0	1,800	0.108
*	240	20.3	24.8	2,350	0.018
14G	0.5	0.9	2.4	10	40.1
15G	0.75	1.1	2.6	13	26.7
16G	1	1.3	2.8	14	20
10G	1.5	1.7	3.2	22	13.7
11G	2.5	2.2	3.7	33	8.21
01G	4	2.8	4.3	47	5.09
02G	6	3.5	4.9	65	3.39
03G	10	4.5	6.1	115	1.95
04G	16	5.3	7.2	180	1.24
05G	25	6.8	9.0	265	0.795
06G	35	7.8	10.3	366	0.565
07G	50	9.5	12.0	500	0.393
08G	70	11.3	13.9	705	0.277
09G	95	13.3	15.8	1,000	0.21
*	120	15.0	17.6	1,250	0.164
*	150	16.3	19.7	1,500	0.132
*	185	17.7	22.0	1,800	0.108

* not VG-types

Electrical characteristics					
Nominal Voltage	U_0/U (U max.) = 0.6/1.0 (1.2) kV				
in d.c.-direct current systems; earthed at one end only	1.1 kV				
test voltage; 5 minutes	<table border="0"> <tr> <td>up to 10 mm²</td> <td>3.5 kV</td> </tr> <tr> <td>up to 16 mm²</td> <td>4.5 kV</td> </tr> </table>	up to 10 mm ²	3.5 kV	up to 16 mm ²	4.5 kV
up to 10 mm ²	3.5 kV				
up to 16 mm ²	4.5 kV				

Temperatures	
Conductor at normal operation	≤ 115 °C
Conductor at short circuit (tinned conductors)	≤ 200 °C
Fixed installation	≥ - 40 °C
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ - 40 °C

Bending radii	
Fixed installation	≥ 3 d
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ 5 d
d = cable diameter	

ATO

acc. to VG 95218 part 20 E
Halogenfree, crosslinked

600 V



Max core temperature: 150°C

Approval/Certificates

For these RHEYHALON® military wires following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance (VDE-Reg.-No. 7763)
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

For inside wiring in switchboards, connecting boxes, control panels etc. on board of navyships.

Standards

VG 95218 part 20 E

Design

1. Conductor

Cu tinned, stranded acc. to
DIN VDE 0295 class 6,
IEC 228 class 6

2. Insulation

two thermoplastic insulation
layers

Core Identification

white (WH)
Nomenclature last figure ..9
green-yellow (GNYE)
Nomenclature last figure ..G
other colours on request

Marking

Marked by printing in contrast-colour on the core and/or on the bobbin

Sample:

| NEXANS | D1427 VDE-Reg.-Nr. 7763 VG 95218 T020E 059 0,75mm² 600 V

ATO 600 V acc. to VG 95218 part 20 E

Type/Part No.	Nominal cross section mm ²	Diameter of conductor max. mm	Diameter of insulated wire		Mass max. kg/km	Conductor resistance at 20 °C max. Ω/km	Cross section AWG
			min. mm	max. mm			
12*	0.15	0.55	0.83	1.13	2.7	135	26
01*	0.25	0.66	0.97	1.29	3.8	84.4	24
02*	0.4	0.84	1.14	1.46	5.5	50.5	22
03*	0.5	0.94	1.22	1.54	7.1	40.1	21
04*	0.6	1.04	1.35	1.67	8.0	31.1	20
05*	0.75	1.20	1.45	1.77	9.6	26.7	19
06*	1.0	1.32	1.60	1.92	11.6	20.0	18
07*	1.2	1.47	1.75	2.07	14.3	15.3	16
08*	1.5	1.68	1.90	2.34	17.0	13.7	15
09*	2.0	1.87	2.16	2.60	21.6	10.5	14
10*	2.5	2.14	2.35	2.79	27.5	8.21	13
11*	3.0	2.29	2.64	3.08	33.3	6.58	12

* 9 for white core, G for green-yellow core

Electrical characteristics	
Nominal Voltage	U_0/U (U max.) = 0.6/1.0 (1.2) kV
in d.c.-direct current systems; earthed at one end only	1.1 kV
test voltage; 5 minutes	up to 10 mm ² 3.5 kV
	up to 16 mm ² 4.5 kV

Temperatures	
Conductor at normal operation	≤ 115 °C
Conductor at short circuit (finned conductors)	≤ 200 °C
Fixed installation	≥ - 40 °C
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ - 40 °C

Bending radii	
Fixed installation	≥ 3 d
If the cables freely moved, the thermal and mechanical conditions have to be mutually agreed upon; normal cases	≥ 5 d
d = cable diameter	

DWK-HX

acc. to VG 95218 part 29

Halogenfree, crosslinked

500 V



Max core temperature: 90°C

Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- BWB Certificate of Approval according to VG 95211
- VDE Certificate of conformity with manufacturing surveillance
- Approval Certificate from „Germanischer Lloyd“
- Approved QPL manufacturer according to VG 95212-22
- Certified manufacturer according to ISO 9001

Applications

Pressurized water tight (longitudinal and transversal water blocked) cable according this specification will be used as connecting cable in moisture rooms and in seawater at pressure up to 60 bar.

Standards

VG 95218 part 29

Design

1. Conductor

consists of 9 tinned wires - 1 inner wire and 8 concentric

2. Filler

Vulcanized rubber compound similar 3GI3 acc. to DIN VDE 0207

3. Insulation

Vulcanized rubber compound 3GI3 acc. to DIN VDE 0207

4. Outer sheath

Crosslinked elastomer compound, colour black

Core Identification

Marking of cores

1. core blue
2. core black

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

| NEXANS | D 0768 VG 95218 T029 A001 DWK-HX 2x1,5 500 V

DWK-HX 500 V

Number of cores	Nominal cross-section mm ²	Diameter		Wall thickness		Weight approx. kg/km
		Core mm	Cable mm	Insulation Standard value mm	Sheath Standard value mm	
2	1.5	3.9 0 -0.4	10.8 ± 0.3	0.7	1.0	165

Electrical and mechanical characteristics

Bending radius

Minimum bending radius for fixed installation	4 d ₄
Minimum bending radius for flexible installation	4 d ₄

Lowest permissible temperature for installation

New buildings and bigger reconstructions	- 10 °C
Small repairs	- 20 °C
	- 30 °C

Current rating

Permissible current intensity will be fixed case by case.
On base of the used materials, the limit temperature of conductor is 90 °C.

LWDC

**With overall screen
halogenfree, crosslinked, waterblocked**

500/500 V



Max core temperature: 85°C

| Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:

- Certified manufacturer according to ISO 9001
- Approval requested at BWB

| Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are intended for permanent installation in or under water pressure up to 60 bar. RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

| Standards

VG 95218 part 29
(draft issue)

| Design

1. Conductor

Copper conductor, stranded tinned, water blocked

2. Insulation

Insulation of crosslinked polyalkene

3. Screen

Copper wire braided screen, tinned, water blocked

4. Outer sheath

Outer sheath of crosslinked elastomer compound, colour black

| Core Identification

White with black printed numbers

| Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

INEXANSI RHEYHALON-Series 911 LWDC 3x1,5 500/500 V

LWDC 500/500 V

Nomenclature	Number of cores and nominal cross section mm ²	Diameter of conductor approx. mm	Wall thickness of insulation nominal mm	Wall thickness sheath nominal mm	Outer diameters min./max.		Cable-Weight approx. kg/km
					mm		
LWDC	2x1.5	2.1	0.4	1.5	11.0	12.6	193
LWDC	3x1.5	2.1	0.4	1.5	11.5	13.1	219
LWDC	7x1.5	2.1	0.4	1.5	14.9	16.5	338
LWDC	12x1.5	2.1	0.4	1.8	19.6	21.8	650
LWDC	24x1.5	2.1	0.4	2.0	26.8	29.1	1,081

Electrical and mechanical characteristics

Nominal Voltage	U _o /U = 500 V / 500 V
Transfer impedance	max. 30 mΩ/m at 10 MHz
Max. permissible operating voltage	AC 500 V DC 870 V
Operating temperature at conductor	+ 85 °C
Minimum bending radius during installation	5 x outer diameter
Lowest permissible temperature for installation	- 10 °C
Longitudinal waterblocked	min. 60 bar
Transverse watertightness	100 bar

LFFGO

Halogenfree, crosslinked



Approval/Certificates

For these RHEYHALON® Navy cables following certificates/ approvals are available:
- Certified manufacturer according to ISO 9001

Applications

RHEYHALON® Navy cables are determined for fixed installation in electrical power systems below and above deck, preferably on ships of the German Navy and/or German design of construction. These cables are not intended for permanent installation in or under water. RHEYHALON® Navy cables fulfill all requirements of BV3400 („Specification for Construction of German Navy vessels“).

Max using temperature: 85°C

Standards

Factory standard

Design

1. Optical fibre

62.5/125 multi mode

2. Inner sheath

halogenfree, thermoplastic material

3. Strength element

4. Outer sheath

Outer sheath of silane crosslinked thermoplastic material, colour black

Marking

Colour of outer sheath black, marked by printing in contrast-colour

Sample:

| NEXANS | RHEYHALON-Series 911 LFFGO 1x62,5/125

LFFGO

Nomenclature	Number of fibres	Wall thickness of inner sheath nominal	Wall thickness of outer sheath nominal	Outer diameters min./max.		Cable-Weight max.
		mm	mm	mm		kg/km
LFFGO	1	0.7	1.0	6.8	7.5	44

Optical and mechanical characteristics	
Max. Operating temperature	+ 85 °C
Minimum bending radius during installation	10 x outer diameter
Lowest permissible temperature for installation	- 10 °C

We have the following VG-approvals

VG 95218 part	Type	Discription	Production factory
10			Monchengladbach
11	E001	cable with braided screen	Nuremberg
12	A	coilcord	Nuremberg
13	A - C		Monchengladbach
20	A	single core insulated wires	Nuremberg
20	C	single core insulated wires	Nuremberg
20	E	single core insulated wires	Nuremberg
20	F	single core insulated wires	Monchengladbach
20	G	single core insulated wires	Nuremberg
21	C	multi core insulated wires	Nuremberg
20	E	multi core insulated wires	Nuremberg
22	C	single core insulated wires with screen and protective cover	Nuremberg
23	F	cables with screen and protective cover	Nuremberg
24	K	single core insulated wires with sheath	Nuremberg
25	G	single core insulated wire, high flexible with sheath	Nuremberg
26	H	single core insulated wire, high flexible screened with sheath	Nuremberg
27	B	cables with sheath	Nuremberg
28	A	screened cables with sheath	Nuremberg
29	A	waterblocked cable	Monchengladbach
60 - 66	all types	navy cables	Monchengladbach
101	A - F	coaxial cables	Nuremberg

Product and Service Range Nexans Germany

Power Engineering

Low, medium and high voltage cables for power transmission and distribution
Submarine and special cables
Mining and pit cables
Insulated overhead lines
Accessories, laying and assembly work
Complete cable systems

Telecommunication

Telecommunication
Communication cables for all outdoor and in-house Telecommunication applications, such as
Optical fibre cables
Copper cables
Accessories
Realisation of complete networks
LAN cabling systems
Connectivity components and cables for data communication in copper and fibre
Telecommunication cables

Special cables

Special cables and systems
Precision cables
- Navy / Military
- Pumps
for different applications, e.g.
- Rolling Stock
- Ship
- Automotive
- Industry Automation
- Mining
- Security
- Cordsets
- Handling
- Bus-cables
- High Temperature
- Control Cables

House-wiring and Industrial Cables

House-wiring cables
Plastic-insulated industrial cables
Rubber-insulated industrial cables
1 kV copper cables
Telecommunication cables
Halogen-free safety cables
Power current control cables
Accessories

Production Lines and Technology

UNIWEMA:
Production Lines for Continuous Forming and TIG / LASER Welding of Smooth or Corrugated Metal Cable Sheaths and Pipes
Composite Pipe Production Lines:
Continuous Production of Plastic-Aluminium-Plastic Pipes
COLOMAT:
Automatic Color Band Marking of plastic insulated Wires
UNIVERO TWIN-ROTOR:
High Speed Screening and Stranding Machine
Cabler for Power Cables:
SZ cabling of Conductors in-line with Sheathing and Jacketing Extruders
Cross Welding Equipment for Metal Strips:
TIG-, LASER- and Ultra Sonic Cross Welding for Splicing coated and blank Metal Strips
Bonded Sheath Equipment:
Sheathing of Medium and High Voltage Cables with copolymer coated Aluminium Tapes
Complete Manufacturing Lines:
Development, planning and execution
CRYOFLEX Transfer Lines:
Systems for Transport of Cryogenic Liquid Gases

Autoelectrics

Harnesses
Active and passive Components
Automotive cables

Metallurgy

Winding wires for a world of applications
- Fine and ultra-fine wires
- Litz and multiparallel wires
- Self-bonding wires
- Continuous transposed cables (CTC)
Copper wire bare, tinned and silvered
Wires and Strands
Dip-formed copper rod

GENERAL CONDITIONS

FOR THE SUPPLY OF PRODUCTS AND SERVICES OF THE ELECTRICAL AND ELECTRONICS INDUSTRY*

for commercial transactions between businesses



sponsored by the Zentralverband Elektrotechnik- und Elektronikindustrie (ZVEI) e. V.

– January 2012 –

I. GENERAL

1. The scope of deliveries and/or services (hereinafter referred to as „Supplies“) shall be determined by the written declarations of both Parties. General terms and conditions of the Purchaser shall apply only if and when expressly accepted by the supplier or the provider of services (hereinafter referred to as „Supplier“) in writing.
2. The Supplier herewith reserves any industrial property rights and/or copyrights pertaining to its cost estimates, drawings and other documents (hereinafter referred to as „Documents“). The Documents shall not be made accessible to third parties without the Supplier's prior consent and shall, upon request, be returned without undue delay to the Supplier if the contract is not awarded to the Supplier. Sentences 1 and 2 shall apply mutatis mutandis to documents of the Purchaser; these may, however, be made accessible to third parties to whom the Supplier may rightfully transfer Supplies.
3. The Purchaser shall have the non-exclusive right to use standard software, provided that it remains unchanged, is used within the agreed performance parameters, and on the agreed equipment. The Purchaser may make one back-up copy without express agreement.
4. Patent Supplies shall be allowed, unless they are unreasonable to accept for the Purchaser.

II. PRICES AND TERMS OF PAYMENT

1. Prices shall be ex works and exclude packaging; value added tax shall be added at the then applicable rate.
2. If the Supplier is also responsible for assembly or erection and unless otherwise agreed, the Purchaser shall pay the agreed remuneration and any incidental costs required, e. g. travel costs, costs for the transport of tools and equipment, and personal luggage as well as allowances.
3. Payments shall be made free Supplier's paying office.
4. The Purchaser may set off only those claims that are undisputed or against which no legal recourse is possible.

III. RETENTION OF TITLE

1. Items pertaining to the Supplies („Retained Goods“) shall remain the property of the Supplier until such and every claim the Supplier has against the Purchaser on account of the business connection has been fulfilled. If the combined value of the security interests of the Supplier exceeds the value of all secured claims by more than 20 %, the Supplier shall release a corresponding part of the security interest if so requested by the Purchaser.
2. For the duration of the retention of title, the Purchaser may not pledge the Retained Goods or use them as security, and retain shall be possible only for insiders in the ordinary course of their business and only on condition that the reseller receives payment from its customer or makes the transfer of property to the customer dependent upon the customer fulfilling its obligation to effect payment.
3. The Purchaser shall inform the Supplier forthwith of any seizure or other act of intervention by third parties.
4. Where the Purchaser fails to fulfil its duties, including failure to make payments due, the Supplier shall be entitled to cancel the contract and take back the Retained Goods in the case of continued failure following expiry of a reasonable time set by the Supplier; the statutory provisions that a time limit is not needed remain unaffected. The Purchaser shall be obliged to surrender the Retained Goods.

IV. TIME FOR SUPPLIES; DELAY

1. Times set for Supplies can only be observed if all Documents to be supplied by the Purchaser, necessary permits and releases, especially concerning plans, are received in time and if agreed terms of payment and other obligations of the Purchaser are fulfilled. Unless these conditions are fulfilled in time, times set shall be extended appropriately; this shall not apply where the Supplier is responsible for the delay.
2. If non-observance of the times set is due to force majeure such as mobilisation, war, rebellion or similar events, e. g. strike or lockout, such time shall be extended accordingly.
3. If the Supplier is responsible for the delay (hereinafter referred to as „Delay“) and the Purchaser demonstrably suffered a loss therefore, the Purchaser

may claim a compensation or liquidated damages of 0.5 % for every completed week of Delay, but in no case more than a total of 5 % of the price of that part of the Supplies which because of the Delay could not be put to the intended use.

4. Purchaser's claims for damages due to delayed Supplies as well as claims for damages in lieu of performance exceeding the limits specified in No. 3 above shall be excluded in all cases of delayed Supplies even upon expiry of a time set to the Supplier to effect the Supplies. This shall not apply in cases of mandatory liability based on intent, gross negligence, or due to injury of life, body or health. Cancellation of the contract by the Purchaser based on statute shall be limited to cases where the Supplier is responsible for the delay. The above provisions do not imply a change in the burden of proof to the detriment of the Purchaser.
5. At the Supplier's request the Purchaser shall declare within a reasonable period of time whether the Purchaser cancels the contract due to the delayed Supplies or insists on the Supplies to be carried out.
6. If dispatch or shipment is delayed at the Purchaser's request by more than one month after notice of the readiness for dispatch was given, the Purchaser may be charged, for every month commencing, storage costs of 0.5 % of the price of the items of the Supplies, but in no case more than a total of 5 %. The parties to the contract may prove that higher or, as the case may be, lower storage costs have been incurred.

V. TRANSFER OF RISK

1. Even where delivery has been agreed freight free, the risk shall pass to the Purchaser as follows:
 - a) if the Supplies do not include assembly or erection, at the time when the Supplies are shipped or picked up by the carrier. Upon request of the Purchaser, the Supplier shall insure the Supplies against the usual risks of transport at the expense of the Purchaser;
 - b) if the Supplies include assembly or erection, at the day of taking over in the own works or, if so agreed, after a fault-free trial run.
2. The risk shall pass to the Purchaser if dispatch, shipping, the start or performance of assembly or erection, the taking over in the own works or the trial run is delayed for reasons for which the Purchaser is responsible or if the Purchaser has otherwise failed to accept the Supplies.

VI. ASSEMBLY AND ERECTION

Unless otherwise agreed in writing, assembly/erection shall be subject to the following provisions:

1. The Purchaser shall provide at its own expense and in good time:
 - a) all earth and construction work and other ancillary work outside the scope of the Supplier, including the necessary skilled and unskilled labour, construction materials and tools;
 - b) the equipment and materials necessary for assembly and commissioning such as scaffolds, lifting equipment and other devices as well as fuels and lubricants;
 - c) energy and water at the point of use including connections, heating and lighting;
 - d) suitable dry and lockable rooms of sufficient size adjacent to the site for the storage of machine parts, apparatus, materials, tools, etc. and adequate working and recreation rooms for the erection personnel, including sanitary facilities as are appropriate in the specific circumstances. Furthermore, the Purchaser shall take all measures it would take for the protection of its own possessions to protect the possessions of the Supplier and of the erection personnel at the site;
 - e) protective clothing and protective devices needed due to particular conditions prevailing on the specific site.
2. Before the erection work starts, the Purchaser shall make available of its own accord any information required concerning the location of concealed electric power, gas and water lines or of similar installations as well as the necessary structural data.
3. Prior to assembly or erection, the materials and equipment necessary for the work to start must be available on the site of assembly/erection and any preparatory work must have advanced to such a degree that assembly/erection can be started as agreed and carried out without interruption. Access roads and the assembly/erection site itself must be level and clear.
4. If assembly, erection or commissioning is delayed due to circumstances for which the Supplier is not responsible, the Purchaser shall bear the reason-

* Translation of the original German text

able costs incurred for idle times and any additional travelling of the Supplier or the erection personnel.

5. The Purchaser shall attest to the hours worked by the erection personnel towards the Supplier at weekly intervals and the Purchaser shall immediately confirm in writing if assembly, erection or commissioning has been completed.
6. If, after completion, the Supplier demands acceptance of the Supplies, the Purchaser shall comply therewith within a period of two weeks. In default thereof, acceptance is deemed to have taken place. Acceptance is also deemed to have been effected if the Supplies are put to use, after completion of an agreed test phase, if any.

VII. RECEIVING OF SUPPLIES

The Purchaser shall not refuse to receive Supplies due to minor defects.

VIII. DEFECTS AS TO QUALITY

The Supplier shall be liable for defects as to quality („Sachmängel“, hereinafter referred to as „Defects“) as follows:

1. All parts or services where a Defect becomes apparent within the limitation period shall, at the discretion of the Supplier, be repaired, replaced or provided again free of charge irrespective of the hours of operation elapsed, provided that the reason for the Defect had already existed at the time when the risk passed.
2. Claims based on Defects are subject to a limitation period of 12 months. This provision shall not apply where longer periods are prescribed by law according to Sec. 438 para. 1 No. 2 (buildings) and things used for a building, Sec. 479 para. 1 (right of recourse), and Sec. 634a para. 1 No. 3 (defects of a building German Civil Code („BGB“), as well as in cases of injury of life, body or health, or where the Supplier intentionally or grossly negligently fails to fulfil its obligation or fraudulently conceals a Defect. The legal provisions regarding suspension of expiration („Ablaufhemmung“), suspension („Hemmung“) and recommencement of limitation periods remain unaffected.
3. The Purchaser shall notify Defects to the Supplier in writing and without undue delay.
4. In the case of notification of a Defect, the Purchaser may withhold payments to a reasonable extent taking into account the Defect occurred. The Purchaser, however, may withhold payments only if the subject-matter of the notification of the Defect occurred is justified beyond doubt. Unjustified notifications of Defect shall entitle the Supplier to have its expenses reimbursed by the Purchaser.
5. The Supplier shall first be given the opportunity to supplement its performance („Nacherfüllung“) within a reasonable period of time.
6. If supplementary performance is unsuccessful, the Purchaser shall be entitled to cancel the contract or reduce the remuneration, irrespective of any claims for damages it may have according to Art. XI.
7. There shall be no claims based on Defect in cases of insignificant deviations from the agreed quality, of only minor impairment of usefulness, of natural wear and tear or damage arising after the transfer of risk from faulty or negligent handling, excessive strain, unsuitable equipment, defective workmanship, inappropriate foundation soil or from particular external influences not assumed under the contract, or from non-reproducible software errors. Claims based on defects attributable to improper modifications or repair work carried out by the Purchaser or third parties and the consequences thereof shall be likewise excluded.
8. The Purchaser shall have no claim with respect to expenses incurred in the course of supplementary performance, including costs of travel and transport, labour, and material, to the extent that expenses are increased because the subject-matter of the Supplies was subsequently brought to another location than the Purchaser's branch office, unless doing so complies with the intended use of the Supplies.
9. The Purchaser's right of recourse against the Supplier pursuant to Sec. 478 BGB is limited to cases where the Purchaser has not concluded an agreement with its customers exceeding the scope of the statutory provisions governing claims based on Defects. Moreover, No. 8 above shall apply mutatis mutandis to the scope of the right of recourse the Purchaser has against the Supplier pursuant to Sec. 479 para. 3 BGB.
10. Furthermore, the provisions of Art. XI (Other Claims for Damages) shall apply in respect of claims of damages. Any other claims of the Purchaser against the Supplier or its agents or any such claims exceeding the claims provided for in this Art. VIII, based on a Defect, shall be excluded.

IX. INDUSTRIAL PROPERTY RIGHTS AND COPYRIGHT; DEFECTS IN TITLE

1. Unless otherwise agreed, the Supplier shall provide the Supplies free from third parties' industrial property rights and copyrights (hereinafter referred to as „IPR“) with respect to the country of the place of destination. If a third party asserts a justified claim against the Purchaser based on an infringement of an IPR with respect to the Supplies made by the Supplier and then sued in conformity with the contract, the Supplier shall be liable to the Purchaser within the time period stipulated in Art. VIII No. 2 as follows:
 - a) The Supplier shall choose whether to acquire, at its own expense, the right to use the IPR with respect to the Supplies concerned or whether to

modify the Supplies such that they no longer infringe the IPR or replace them. If this would be unreasonable to demand from the Supplier, the Purchaser may cancel the contract or reduce the remuneration pursuant to the applicable statutory provisions.

- b) The Supplier's liability to pay damages shall be governed by Art. XI.
 - c) The above obligations of the Supplier shall only apply if the Purchaser i) immediately notifies the Supplier of any such claim asserted by the third party in writing, ii) does not concede the existence of an infringement and iii) leaves any protective measures and settlement negotiations to the discretion of the Supplier. If the Purchaser stops using the Supplies in order to reduce the damage or for other good reasons, it shall be obliged to point out to the third party that no acknowledgement of the alleged infringement may be inferred from the fact that the use has been discontinued.
2. Claims of the Purchaser shall be excluded if it is itself responsible for the infringement of an IPR.
 3. Claims of the Purchaser shall also be excluded if the infringement of the IPR is caused by specifications made by the Purchaser, to a type of use not foreseeable by the Supplier or to the Supplies being modified by the Purchaser or being used together with products not provided by the Supplier.
 4. In addition, with respect to claims by the Purchaser pursuant to No. 1 a) above, Art. VIII Nos. 4, 5, and 9 shall apply mutatis mutandis in the event of an infringement of an IPR.
 5. Where other defects in title occur, Art. VIII shall apply mutatis mutandis.
 6. Any other claims of the Purchaser against the Supplier or its agents or any such claims, exceeding the claims provided for in this Art. IX, based on a defect in title, shall be excluded.

X. IMPOSSIBILITY OF PERFORMANCE; ADAPTATION OF CONTRACT

1. To the extent that Supplies are impossible to be carried out, the Purchaser shall be entitled to claim damages, unless the Supplier is not responsible for the impossibility. The Purchaser's claim for damages shall, however, be limited to an amount of 10 % of the value of the part of the Supplies which, owing to the impossibility, cannot be put to the intended use. This limitation shall not apply in the case of mandatory liability based on intent, gross negligence or injury of life, body or health; this does not imply a change in the burden of proof to the detriment of the Purchaser. The right of the Purchaser to cancel the contract shall remain unaffected.
2. Where unforeseeable events within the meaning of Art. IV No. 2 substantially change the economic importance or the contents of the Supplies or considerably affect the Supplier's business, the contract shall be adapted taking into account the principles of reasonableness and good faith. Where doing so is economically unfeasible, the Supplier shall have the right to cancel the contract. If the Supplier intends to exercise its right to cancel the contract, it shall notify the Purchaser thereof without undue delay after having realised the repercussions of the event; this shall also apply even where an extension of the delivery period had previously been agreed with the Purchaser.

XI. OTHER CLAIMS FOR DAMAGES

1. Any claims for damages and reimbursement of expenses the Purchaser may have (hereinafter referred to as „Claims for Damages“), based on whatever legal reason, including infringement of duties arising in connection with the contract or tort, shall be excluded.
2. The above shall not apply in the case of mandatory liability, e. g. under the German Product Liability Act („Produkthaftungsgesetz“), in the case of intent, gross negligence, injury of life, body or health, or breach of a condition which goes to the root of the contract („wesentliche Vertragslichter“). However, Claims for Damages arising from a breach of a condition which goes to the root of the contract shall be limited to the foreseeable damage which is intrinsic to the contract, unless caused by intent or gross negligence or based on liability for injury of life, body or health. The above provision does not imply a change in the burden of proof to the detriment of the Purchaser.
3. To the extent that the Purchaser has a valid Claim for Damages according to this Art. XI, it shall be time-barred upon expiration of the limitation period applicable to Defects pursuant to Art. VIII No. 2. In the case of claims for damages under the German Product Liability Act, the statutory provisions governing limitation periods shall apply.

XII. VENUE AND APPLICABLE LAW

1. If the Purchaser is a businessperson, sole venue for all disputes arising directly or indirectly out of the contract shall be the Supplier's place of business. However, the Supplier may also bring an action at the Purchaser's place of business.
2. Legal relations existing in connection with this contract shall be governed by German substantive law, to the exclusion of the United Nations Convention on Contracts for the International Sale of Goods (CISG).

XIII. SEVERABILITY CLAUSE

The legal invalidity of one or more provisions of this contract shall in no way affect the validity of the remaining provisions. This shall not apply if it would be unreasonable for one of the parties to continue the contract.



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