

**Habiatron**  
Radiation tolerant cables and coaxials

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## Introduction

Established in 1941, Habia Cable has developed a wealth of experience in the design and manufacture of high performance wires and cables to meet the requirements of international standards and exacting customer specifications. With over 30 years experience in the design and manufacture of wires and cables for demanding applications, our experience in the nuclear industry is strong and diverse. Manufacturing facilities in Sweden, Germany, China and Poland together with Research and Development provide a high level of support to Habia Cable's network of Sales Offices throughout Europe and the Far East.

Habia Cable holds accreditation to ISO 9001 and ISO 14001.

Habia Cable is owned by the Beijer Alma group of companies, an internationally active industrial group, focussed on production of components for customers in the high technology sectors. The company aim is to create competitive companies in selected market segments through active, long term development.

### Nuclear

Habia Cable's experience in the nuclear wire and cable industry is strong and diverse. Our range of Habiatron specialist wires and cables has been developed following considerable research and development into the unique needs of nuclear environments and naturally it incorporates all the quality, reliability, consistency and efficiency aspects which have become the hallmark of Habia Cable. We can also offer custom-designed solutions which are engineered to meet the most demanding nuclear applications.

We have applied our cable knowledge from applications in the management of the manufacturing of the fuel, to its long-term safe storage sites. Cable and cable systems are designed with the environment in mind, providing a solution that is 'fit for purpose'.

Our understanding and knowledge on the effects of radiation on polymers has been gained through working with and learning from large organisations such as Westinghouse Atom (Sweden), BNFL (UK), CERN (Switzerland) and SCK/CEN (Belgium). Habia Cable also employs and cooperates with research institutes to prove our materials are suitable for each specific application.

With our Habiatron range of cable products, we now believe that we have insulation and sheathing materials with unique radiation tolerant properties and that by working closely with engineers and specifiers, we can supply proven materials into the World Nuclear Market.

### Operational

Including in the same cable not only power, control and measurement, but also air or hydraulic power and longitudinal reinforcement

### Dimensional

Responding to requirements in terms of minimum diameter or reduced bending radius

### Safety

Guaranteeing no flame propagation and non-emission of toxic gases for intrinsically safe circuits

### Immunity

Assuring the cable gives optimum protection against electromagnetic interference

### Reliability

Ensuring valid operational parameters for a given lifetime.

Our Habiatron solutions can significantly extend the lifetime of the cables you buy from us, giving you value for money and the confidence that you can rely on our cables to do their work.

## Habiatron

### Additives...

All Habia Cable's Habiatron products are fully RoHS compliant.

### Cables to nuclear industry approvals

The Habiatron range complies with most standards established by the International Nuclear Authorities:

- IEEE (LOCA)
- IEC 60331
- IEC 60332
- NF C 32070 C1 or C2
- IEC 60754, IEC 60544.

Our Habiatron nuclear cable solutions can significantly extend the lifetime of the cables you buy from us, giving you value for money and the confidence that you can rely on our cables to do their work.

## Nuclear cable types

Our range of Habiatron custom design and hybrid cables have been developed following considerable research and development into the unique needs associated with nuclear environments and naturally incorporate all the elements you would expect from Habia: quality, reliability, consistency and efficiency.

As a leading manufacturer of special wires and cables, Habia Cable is active in many nuclear programs around the world. We are also able to meet specific customer requirements by incorporating various power and signal wires into hybrid cables.

We can also offer custom-designed solutions which are engineered to meet the most demanding nuclear applications.

### Habiatron C

Available in CQ (Q class) and CR (R class) types, Habia's safety cable range is also able to extend to coaxial cables.

### Habiatron M

The ingoing cores to our Q class cables.

### Habiatron MM

Manufactured in conjunction with Ultra Electronics, Habiatron MM cables are used in systems that require high immunity from the surrounding environment along with high radiation and temperature resistance. Performance is guaranteed by using optimised braids, high permittivity magnetic tapes and anti-microphonic coatings.

### Habiatron Q

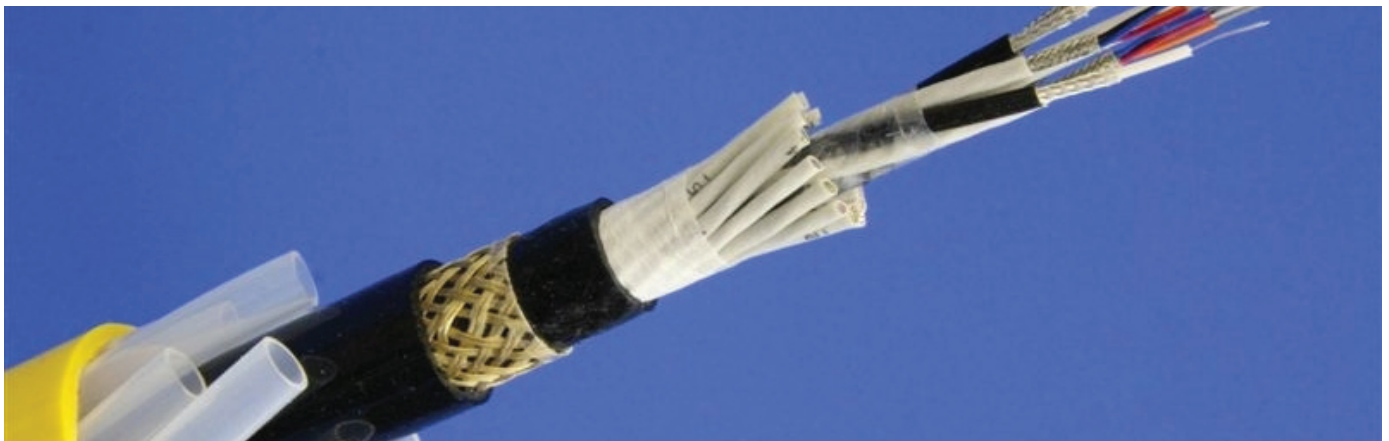
The new generation of extended life LOCA approved cables with HFI 260 insulation and HFS 105 XL B sheathing offers an actual lifetime in a nuclear environment when considering the measured activation energy is 60 years at insulation temperature up to 109°C and jacket temperature 61°C.

Designed for use in Class 1E safety systems such as primary pumps, safety valves, volume controls and emergency shut-down systems (where the cable must continue operation).

The Habiatron Q cable concept is independently qualified for an operational life of 60 years operation at up to 109°C with a jacket operating temperature of 61°C.

### Habiatron R

Safety cables used for monitoring safety related functions within the power plant. Mainly used within containment areas where they offer a high level of performance, coupled with excellent smoke generation and flame retardant properties.



### Coax

Temperature	-30°C to +70°C
Conductor temp.	40 years at +90°C
Flame retardant	
Frequency range	Up to 2,5 GHz
Screening efficiency	-70dB (double braid)
Velocity propagation	66%

### Construction

Conductor	Tin Plated Copper (TPC) Copper Covered Steel (CCS) Copper/Polyester Foil (F)	Dielectric	HFI 90 XL
Shield(s)	Braid of Tin Plated Copper (T) Braid of Silver Plated Copper (S)	Sheath	Q Class HFS 105 XL B R Class HFS 80 N

### Identification

Dielectric	Natural
Sheath	Black
Marking	TYPE Habia Cable ORDER REFERENCE YEAR-WEEK BATCHCODE LENGTH (e.g.: RG 58 Q Class Black Habia Cable 36000-058-00 2012-W20 121026001 0001)

Description	Construction						Electrical			MBR	Order reference
	conductor material	conductor Ø	dielectric Ø	shield (s) Ø	sheath (s) Ø	weight g/m	V rms	imp. Ω	cap. pF/m	static dynamic	
Habiatron C RG 58 Q	TPC 19x 0,18	0,90	2,95	T: 3,55 F: 3,70	4,95 8,20	96	1400 -	50	105	80 160	700044838
Habiatron C RG 58 R	TPC 19x 0,18	0,90	2,95	T: 3,55 F: 3,65	4,95 8,20	95	1400 -	50	105	80 160	700044839
Habiatron C RG 59 Q	SCCS 1x 0,57	0,57	3,70	S: 4,40 F: 4,50	6,15 9,80	130	1700 -	75	72	100 200	700044840
Habiatron C RG 59 R	SCCS 1x 0,57	0,57	3,70	S: 4,40 F: 4,50	6,15 9,80	130	1700 -	75	72	100 200	700044841

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Electrical data (table)	Attenuation (dB/100m)						Power (W)					
	Frequency (MHz)						Frequency (MHz)					
	30	100	400	1000	2500	6000	30	100	400	1000	2500	6000
RG 58	9	17	35	56	91	-	329	180	90	57	36	-
RG 59	6	11	23	37	61	-	560	307	153	97	61	-

Ref: HTron\_C\_01 Created: CJV Approved: AE Date: 2013-09-12

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## Habiatron C Q and R class coaxial cables

-30°C/+70°C

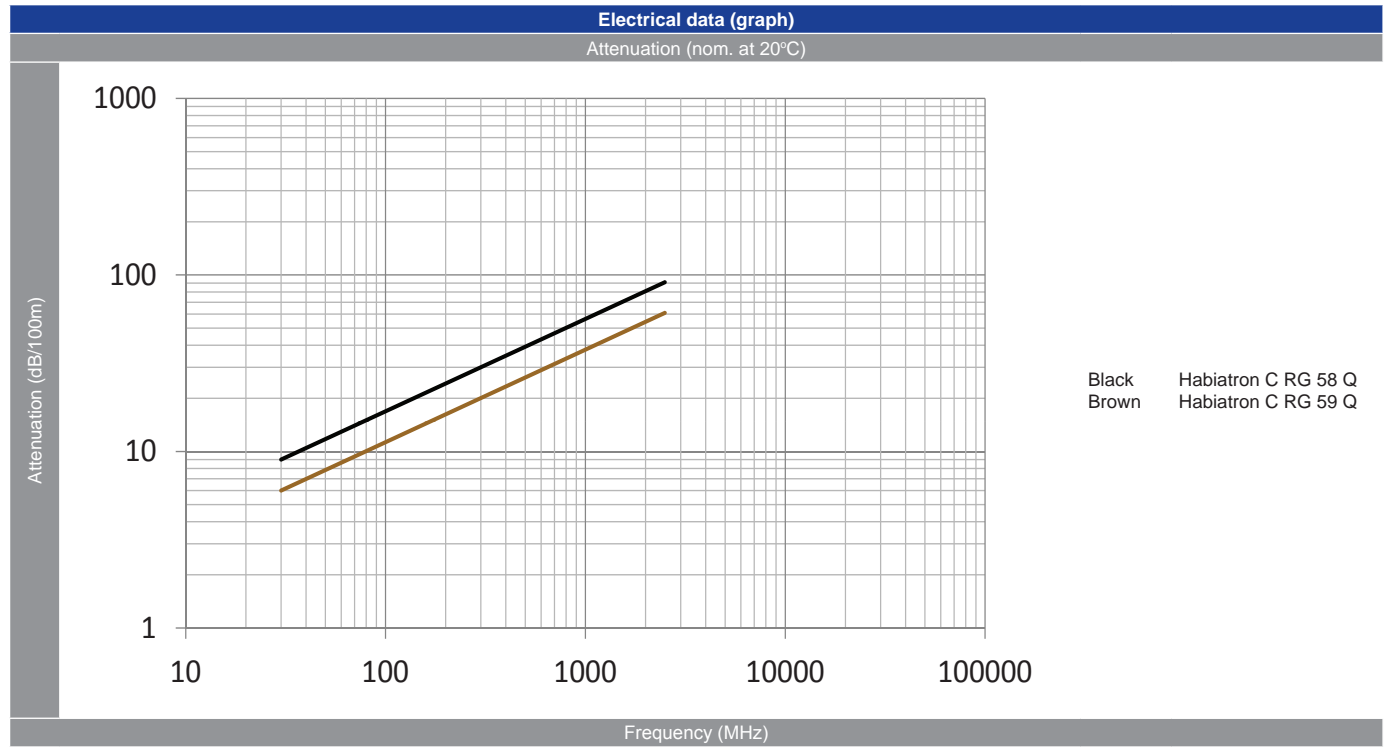
### Application

Designed for use in Class 1 safety systems such as primary pumps, safety valves, volume controls and emergency shut-down systems; Habiatron Q cables are independently qualified for an operation al life of 60 years operating at up to 109°C, with a jacket operating temperature of 61°C.

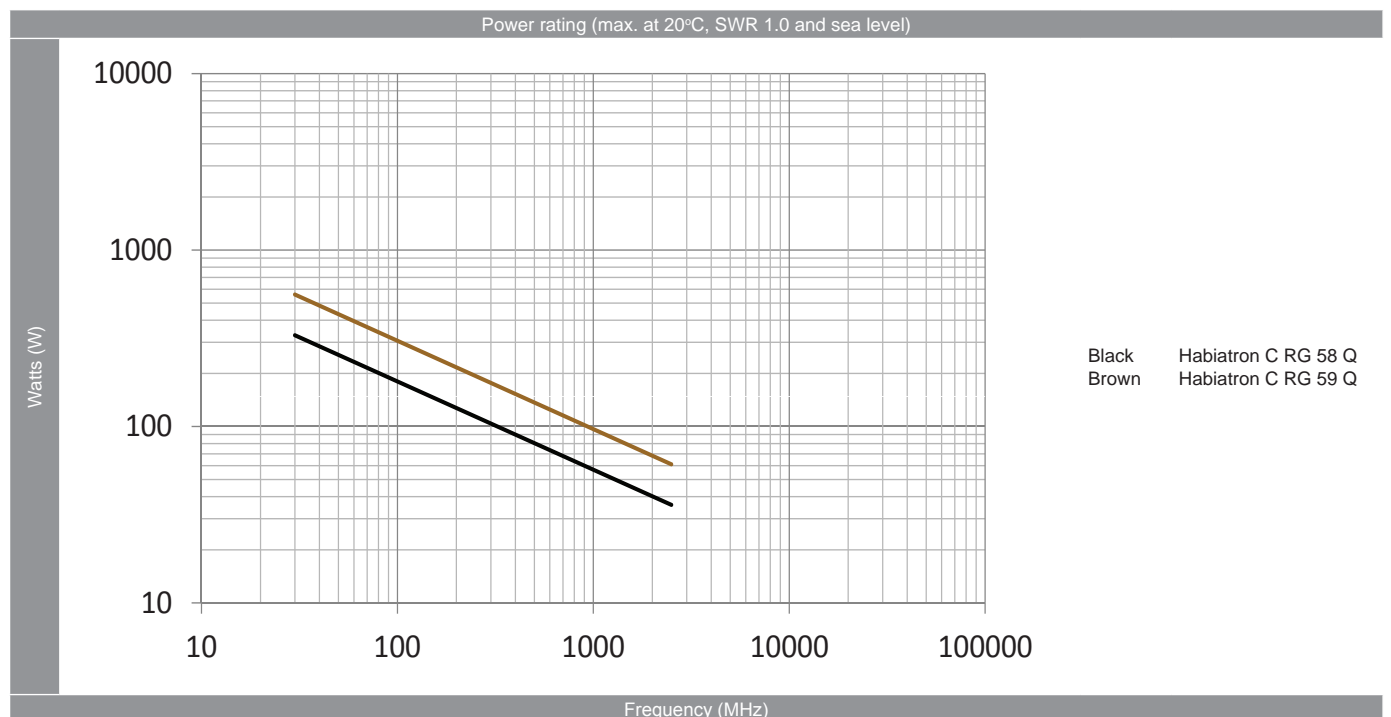
Habiatron R cables are designed as safety cables used for monitoring safety related functions within the power plant; mainly within containment areas where they offer a high level of performance, especially in the areas of smoke generation and flame retardancy.

### Variants

The Habatron C range of coaxial cables is a complement to Habia's standard RG PVC and RG (LS0H) products.



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### Single core

Voltage	600/1000V AC U <sub>0</sub> /U
Test voltage	3000V AC
Flame retardant	
Halogen free	
Low smoke generation	
Radiation tolerant	10 <sup>7</sup> Gy

### Construction

Conductor	Tin Plated Copper (TPC)	Insulation	HFI 260
Shield(s)	-	Sheath	-

### Application

Available in both AWG and metric (Class 5) sizes. HFI 260 was designed as part of the Habiatron range of wires, cables and coaxial cables and is LSZH, FR and has exceptional radiation resistance. Often used in control, signal and instrumentation applications.

Description	Size		Conductor			Finished Wire			Electrical amps at 40°C	Order reference
	AWG	CSA mm <sup>2</sup>	stranding	resistance Ω/km	wire Ø	core Ø	tolerance	weight g/m		
M/TPC 3007	30	0,05	7 x 0,10	354,30	0,30	0,75	±0,07	0,9	3	915cc3007
M/TPC 2807	28	0,09	7 x 0,13	223,80	0,38	0,83	±0,07	1,2	4	915cc2807
M/TPC 2619	26	0,16	19 x 0,10	131,60	0,48	0,96	±0,07	1,9	5	915cc2619
M/TPC 2419	24	0,22	19 x 0,13	83,30	0,60	1,14	±0,10	2,7	7	915cc2419
M/TPC 2219	22	0,34	19 x 0,16	52,20	0,76	1,32	±0,10	4,0	10	915cc2219
M/TPC 0,5	-	0,50	16 x 0,20	40,10	0,88	1,44	±0,10	5,2	12	915cc0050
M/TPC 2019	20	0,60	19 x 0,20	32,00	0,96	1,52	±0,10	6,2	13	915cc2019
M/TPC 0,75	-	0,75	24 x 0,20	26,70	1,05	1,65	±0,10	7,5	15	915cc0075
M/TPC 1819	18	0,96	19 x 0,25	20,40	1,20	1,80	±0,10	9,5	18	915cc1819
M/TPC 1,0	-	1,00	32 x 0,20	20,00	1,20	1,84	±0,10	9,5	18	915cc0100
M/TPC 1619	16	1,23	19 x 0,29	15,80	1,36	2,01	±0,13	12,0	22	915cc1619
M/TPC 1,5	-	1,50	30 x 0,25	13,70	1,50	2,15	±0,13	14,8	25	915cc0150
M/TPC 1419	14	1,87	19 x 0,36	10,00	1,71	2,36	±0,13	18,5	30	915cc1419
M/TPC 2,5	-	2,50	50 x 0,25	8,21	1,95	2,61	±0,13	24,0	35	915cc0250
M/TPC 1237	12	2,97	37 x 0,32	2,20	2,24	2,90	±0,13	29,0	41	915cc1237

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Available colours (replace 'cc' in the order reference)

00 Black	-	-	-	-	-	-	-	-	-	-	89 Natural	-
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Ref: HTron\_M\_13 Created: CJV Approved: AE Date: 2013-09-12

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## Habiatron MM

### Super-screened coax

Temp.	LSF HFI	-40°C to +90°C -50°C to +135°C
Flame retardant		IEC 60332-1-2 UL 1581 VW-1
Radiation tolerant		>10 <sup>6</sup> Gy
Smoke generation		IEC 61034-2
Toxicity		IEC 60754-2
Frequency range		Up to 2,5 GHz
Screening efficiency		>100dB

### Construction

Conductor	Plain Copper (CU) Silver Plated Copper (SPC)	Dielectric	(LSF): HFI 90 (HFI): HFI 150
Shield(s)	Multi-layered composite of braid wires and foils	Sheath	(LSF): HFS 100 (HFI): HFI 150

### Application

Manufactured in partnership with Ultra Electronics, Habiatron MM Coaxial Cables are used in systems that require high immunity from the surrounding environment, high radiation tolerance and temperature resistance. Performance is guaranteed by using optimised braids, high permittivity magnetic tapes and anti-microphonic coatings.

Description	Construction						Electrical			MBR	Order reference
	conductor material	conductor Ø	dielectric Ø	shield (s) Ø	sheath (s) Ø	weight g/m	V rms	imp. Ω	cap. pF/m	static	
MM 10/75 (LSF)	CU solid	0,42	2,45	4,60	6,00	60	2000 3000	75	75	60 120	37789-009-01
MM 11/50 (LSF)	CU solid	0,90	2,95	4,58	6,00	60	2500 3000	50	100	60 120	303-06721-010
MM 15/50 (LSF)	SPC solid	0,90	2,95	5,58	7,00	90	3000	100	100	70 140	31787-005-01
MM 15/50 (HFI 150)	SPC solid	0,81	2,95	5,62	7,00	102	2500 3000	50	111	70 140	31789-002-01
MM 17/33 (LSF)	CU solid	1,21	2,45	5,60	7,00	100	2000 3000	33	175	70 140	203-07491-010
MM 20/75 (LSF)	CU solid	0,42	2,45	5,58	7,00	94	2000 3000	75	75	70 140	37789-004-02
MM 20/75 (HFI 150)	CU solid	0,40	2,85	5,60	7,00	98	2000 3000	75	90	70 140	37789-004-01

### Multi core cable, screened

Voltage	600/1000V AC U <sub>0</sub> /U
Test voltage	3000V AC
Flame retardant	IEC 60332-1-2 UL 1581 VW-1
Radiation tolerant	>10 <sup>6</sup> Gy
Smoke generation	IEC 61034-2
Toxicity	IEC 60754-2

- IEEE 323:1974
- IEEE 383:1974

Also available as an un-screened option.

### Construction

Conductor	Tin Plated Copper (TPC)	Insulation	HFI 260
Shield(s)	Copper / Polyester Foil (F) *	Sheath	HFS 105 XL B

\* Some sizes / constructions may use a braid of Tin Plated Copper (T)

### Identification




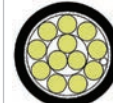

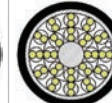
Marking	TYPE CORES x SIZE VOLTAGE SCREEN ORDER REFERENCE YEAR-WEEK (e.g.: Habiatron Q 2x 20 AWG 600V S 700044341 2012-W39)
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### Application

Designed for use in Class 1 safety systems such as primary pumps, safety valves, volume controls and emergency shut-down systems; Habiatron Q cables are independently qualified for an operation al life of 60 years operating at up to 109°C, with a jacket operating temperature of 61°C.

Description	Construction							Electrical amps at 40°C max	NSN	Order reference
	no. / size CSA	conductor Ø	insulation Ø	cabled Ø	shield (s) Ø	sheath (s) Ø	weight g/m			
M/TPC 2019 STQ 2	2x 0,60	0,96	1,52	3,0	3,2	4,8	42	10	-	700044341
M/TPC 1,0 STQ 2	2x 1,00	1,20	1,84	3,7	3,9	5,5	56	14	-	700044362
M/TPC 1619 STQ 2	2x 1,23	1,36	2,01	4,0	4,2	5,8	64	17	-	700044350
M/TPC 1419 STQ 2	2x 1,87	1,70	2,36	4,7	4,9	6,5	89	23	-	700044353
M/TPC 2,5 STQ 2	2x 2,50	1,95	2,65	5,3	5,5	7,5	114	27	-	700044365
M/TPC 1237 STQ 2	2x 2,98	2,20	2,90	5,8	6,0	8,0	140	31	-	700044356
M/TPC 1037 STQ 2	2x 4,65	2,82	3,53	7,1	7,3	9,3	203	44	-	700044359
M/TPC 10 STQ 2	2x 10,00	3,93	4,83	9,7	9,9	12,3	384	73	-	700044368
M/TPC 2019 STQ 3	3x 0,60	0,96	1,52	3,8	4,0	5,6	53	9	-	700044342
M/TPC 1,0 STQ 3	3x 1,00	1,20	1,84	4,0	4,2	5,8	68	13	-	700044363
M/TPC 1619 STQ 3	3x 1,23	1,36	2,01	4,3	4,5	6,1	75	15	-	700044351
M/TPC 1419 STQ 3	3x 1,87	1,70	2,36	5,1	5,3	7,3	114	21	-	700044354
M/TPC 2,5 STQ 3	3x 2,50	1,95	2,65	5,7	5,9	7,9	146	25	-	700044366
M/TPC 1237 STQ 3	3x 2,98	2,20	2,90	6,3	6,5	8,5	150	29	-	700044357
M/TPC 1037 STQ 3	3x 4,65	2,82	3,53	8,4	8,6	11,0	261	40	-	700044360
M/TPC 10 STQ 3	3x 10,00	3,93	4,83	10,4	10,6	13,2	506	68	-	700044369
M/TPC 2019 STQ 4	4x 0,60	0,96	1,52	3,7	3,9	5,5	59	8	-	700044343
M/TPC 1,0 STQ 4	4x 1,00	1,20	1,84	4,7	4,9	6,5	82	12	-	700044364
M/TPC 1619 STQ 4	4x 1,23	1,36	2,01	5,0	5,2	7,2	100	14	-	700044352
M/TPC 1419 STQ 4	4x 1,87	1,70	2,36	6,4	6,6	8,6	151	19	-	700044355
M/TPC 2,5 STQ 4	4x 2,50	1,95	2,65	6,6	6,8	8,8	179	22	-	700044367
M/TPC 1237 STQ 4	4x 2,98	2,20	2,90	7,6	7,8	9,8	210	26	-	700044358
M/TPC 1037 STQ 4	4x 4,65	2,82	3,53	9,1	9,3	11,7	343	37	-	700044361
M/TPC 2019 STQ 12	12x 0,60	0,96	1,52	6,3	6,5	8,5	133	6	-	700044344
M/TPC 2019 STQ 14	14x 0,60	0,96	1,52	6,7	6,9	8,9	150	5	-	700044345
M/TPC 2019 STQ 20x2	20 pr 0,60	0,96	1,52	14,1	(N) 15,0	18,0	513	4	-	700044346

Other designs are available for this part of the standard and will be incorporated on an on-going basis - should you require an item that is not included within this table, please contact one of our sales offices.

Cable Construction										
2 core	3 core	4 core	12 core	14 core	20 pair	-	-	-	-	-
										



## Habiatron R (ETFE / HFS 80 N)

600V  
-25°C/+80°C

### Multi core cable, screened

Voltage	600/1000V AC U <sub>0</sub> /U
Test voltage	3000V AC
Flame retardant	IEC 60332-1-2
Radiation tolerant	>10 <sup>4</sup> Gy
Smoke generation	IEC 61034-2

Also available as a screened option.

### Construction

Conductor	Tin Plated Copper (TPC)	Insulation	ETFE
Shield	-	Sheath	HFS 80 N

### Identification

Cores	White and numbered
Sheath	Black
Marking	TYPE CORES x SIZE VOLTAGE SCREEN ORDER REFERENCE YEAR-WEEK (e.g. Habiatron R 2x 16 AWG 600V 700044373 2012-W39)




### Application

Habiatron R cables are designed as safety cables used for monitoring safety related functions within the power plant; mainly within containment areas where they offer a high level of performance, especially in the area of excellent smoke generation and flame retardancy.

Description	Construction							Electrical amps at 40°C max	NSN	Order reference
	no. / size CSA	conductor Ø	insulation Ø	cabled Ø	shield (s) Ø	sheath (s) Ø	weight g/m			
ZN 1619 TW 2	2x 1,23	1,36	2,01	4,2	-	5,8	53	15	-	700044373
ZN 1419 TW 2	2x 1,87	1,70	2,36	4,9	-	6,5	72	20	-	700044376
ZN 2,5 TW 2	2x 2,50	1,95	2,71	5,6	-	7,6	99	24	-	700044391
ZN 1237 TW 2	2x 2,98	2,20	2,90	6,0	-	8,0	118	28	-	700044379
ZN 1037 TW 2	2x 4,65	2,82	3,53	7,3	-	9,3	177	38	-	700044382
ZN 6133 TW 2	2x 14,00	5,27	6,35	12,9	-	15,5	504	84	-	700044385
ZN 25 TW 2	2x 25,00	7,20	8,30	16,8	-	19,8	787	130	-	700044394
ZN 50 TW 2	2x 50,00	10,70	12,20	24,6	-	28,4	1541	184	-	700044396
ZN 1819 TW 3	3x 0,96	1,21	1,80	4,1	-	5,7	56	11	-	700044371
ZN 1619 TW 3	3x 1,23	1,36	2,01	4,5	-	6,1	70	14	-	700044374
ZN 1419 TW 3	3x 1,87	1,70	2,36	5,3	-	7,3	98	19	-	700044377
ZN 2,5 TW 3	3x 2,50	1,95	2,71	6,0	-	8,0	123	22	-	700044392
ZN 1237 TW 3	3x 2,98	2,20	2,90	6,4	-	8,4	145	26	-	700044380
ZN 1037 TW 3	3x 4,65	2,82	3,53	7,8	-	9,8	214	36	-	700044383
ZN 6133 TW 3	3x 14,00	5,27	6,35	13,9	-	16,7	593	78	-	700044386
ZN 4133 TW 3	3x 22,00	6,65	7,92	17,6	-	20,8	942	108	-	700044388
ZN 25 TW 3	3x 25,00	7,20	8,30	18,5	-	21,7	1027	120	-	700044395
ZN 2665 TW 3	3x 33,70	8,51	9,86	21,9	-	25,7	1463	135	-	700044390
ZN 50 TW 3	3x 50,00	10,70	12,20	27,0	-	31,6	2139	179	-	700044397
ZN 1819 TW 4	4x 0,96	1,21	1,80	4,5	-	6,1	69	10	-	700044372
ZN 1619 TW 4	4x 1,23	1,36	2,01	5,0	-	7,0	90	12	-	700044375
ZN 1419 TW 4	4x 1,87	1,70	2,36	5,9	-	7,9	129	17	-	700044378
ZN 2,5 TW 4	4x 2,50	1,95	2,71	6,7	-	8,7	157	20	-	700044393
ZN 1237 TW 4	4x 2,98	2,20	2,90	7,2	-	9,2	185	23	-	700044381
ZN 1037 TW 4	4x 4,65	2,82	3,53	8,7	-	11,1	289	32	-	700044384
ZN 6133 TW 4	4x 14,00	5,27	6,35	15,8	-	18,8	798	71	-	700044387
ZN 4133 TW 4	4x 22,00	6,65	7,92	19,6	-	22,8	1213	98	-	700044389

Other designs are available for this part of the standard and will be incorporated on an on-going basis - should you require an item that is not included within this table, please contact one of our sales offices.

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Cable Construction										
2 core	3 core	4 core	-	-	-	-	-	-	-	-
										

Ref: HTron\_RS\_03 Created: GJV Approved: AE Date: 2013-09-12

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## Habiatron LOCA environments

### Additives...

The term: LOCA refers to a 'Loss Of Coolant Accident'. Under LOCA conditions, cabling is subjected to extreme pressures and temperatures for a limited time.

Habia Cable is a leading manufacturer of cables that can operate in LOCA conditions.

### Cables to nuclear industry approvals

The Habiatron range complies with most standards established by the International Nuclear Authorities:

- IEEE (LOCA)
- IEC 60331
- IEC 60332
- NF C 32070 C1 or C2
- IEC 60754, IEC 60544.

Our Habiatron nuclear cable solutions can significantly extend the lifetime of the cables you buy from us, giving you value for money and the confidence that you can rely on our cables to do their work.

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