



**Harbour**  
INDUSTRIES

**Mil-Spec**  
**Commercial and Industrial**  
**High Temperature Wire & Cable**



**NEMA HP3 & HP4**  
**UL Styles**  
**SAE AS22759**  
**NEMA WC 27500**

**Single &**  
**Multi-Conductor**  
**Constructions**

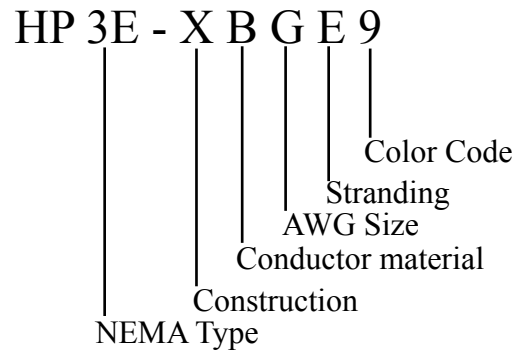


# Mil-Spec Wire and Cable

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# NEMA HP3/HP4 REFERENCE GUIDE

replaces M16878



## Construction

X = Extruded

W = Wrapped (HP3 only)

## AWG Size

B	30
C	28
D	26
E	24
F	22
G	20
H	18
J	16
K	14
L	12
M	10
N	8
P	6
R	4
S	2
T	1
U	1/0
W	2/0
Y	3/0
Z	4/0

## NEMA Type

HP3	Dielectric
E	PTFE
EE	PTFE
ET	PTFE
HP4	Dielectric
K	FEP
KK	FEP
KT	FEP

## Conductor

B	Silver plated copper
C	Nickel plated copper
D	Silver plated high-strength alloy
E	Nickel plated high-strength alloy
F	Silver plated copper clad steel
G	Nickel plated copper clad steel
H	Tin plated copper (HP4 only)

## Stranding

A	1
B	7
E	19
G	37
L	133
P	665
R	817
S	1045
T	1330
V	1665
W	2109

## Color Code

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White

**\*Constructions listed are those currently manufactured by Harbour Industries**

# NEMA HP-4 TYPES K, KK, KT

*Replaces M16878/11, /12, /13*

## Construction

Stranded or solid tin or silver plated copper

Extruded FEP

## Ratings/Approvals

TPC 150° C SPC 200° C

NEMA HP-3 has no requirement for the wire to be printed.

	Type K		Type KK		Type KT		DC Resistance
Voltage Rating	600		1000		250		
AWG/Stranding	Mils/OD	lbs/mft	Mils/OD	lbs/mft	Mils/OD	lbs/mft	Ohms/mft
30 1/30	10/.030"	1	15/.040"	1	6/.022"	1	106.0
30 7/38	10/.032"	1	15/.042"	1	6/.024"	1	100.0
28 1/28	10/.033"	2	15/.043"	2	6/.025"	1	66.7
28 7/36	10/.035"	2	15/.045"	2	6/.027"	1	63.6
28 19/40	10/.035"	2	15/.045"	2	6/.027"	1	63.1
26 1/26	10/.036"	2	15/.046"	2	6/.028"	2	41.9
26 7/34	10/.039"	2	15/.049"	2	6/.031"	2	39.7
26 19/38	10/.039"	2	15/.049"	2	6/.031"	2	37.3
24 1/24	10/.040"	3	15/.050"	3	6/.032"	3	26.2
24 7/32	10/.044"	3	15/.054"	3	6/.036"	3	24.5
24 19/36	10/.045"	3	15/.055"	3	6/.036"	3	23.6
22 1/22	10/.045"	4	15/.055"	4	6/.038"	3	16.5
22 7/30	10/.050"	4	15/.060"	4	6/.042"	3	15.6
22 19/34	10/.051"	4	15/.061"	5	6/.042"	4	14.8
20 1/20	10/.052"	5	15/.062"	6	6/.044"	5	10.3
20 7/28	10/.058"	5	15/.068"	6	6/.050"	5	9.8
20 19/32	10/.058"	5	15/.068"	7	6/.050"	5	9.1
18 7/26	10/.069"	8	15/.079"	9	-	-	6.2
18 19/30	10/.069"	8	15/.079"	9	-	-	5.8
16 19/29	13/.080"	10	18/.089"	11	-	-	4.5
14 19/27	13/.095"	15	18/.106"	17	-	-	2.9
12 19/25	15/.114"	23	21/.125"	35	-	-	1.8
10 37/26	13/.134"	35	19/.145"	68	-	-	1.2
8 133/29	-	-	24/.209"	107	-	-	0.7

Additional constructions available - check with the factory for details

All figures referenced are nominal

# SAE-AS22759 Mineral Filled PTFE

*Replaces MIL-W-22759/5, /6, /7, /8*

## Construction

Stranded silver or nickel plated conductor

Extruded mineral filled Polytetrafluoroethylene (PTFE)

## Ratings/Approvals

Printed in accordance with SAE-AS22759

600 Volts

	AS22759/5		AS22759/6		AS22759/7		AS22759/8	
Temperature (° C)	200°C		260°C		200°C		260°C	
Conductor Type	SPC		NPC		SPC		NPC	
AWG/Stranding	Mils/OD	lbs/mft	Mils/OD	lbs/mft	Mils/OD	lbs/mft	Mils/OD	lbs/mft
24 19/36	26/.075"	7	26/.075"	7	19/.062"	4	19/.062"	4
22 19/34	28/.085"	8	28/.085"	8	22/.073"	6	22/.073"	6
20 19/32	29/.095"	10	29/.095"	10	22/.082"	8	22/.082"	8
18 19/30	31/.110"	14	31/.110"	14	22/.092"	11	22/.092"	11
16 19/29	36/.125"	18	36/.125"	18	24/.102"	14	24/.102"	14
14 19/27	38/.143"	25	38/.143"	25	23/.115"	19	23/.115"	19
12 19/25	38/.160"	33	38/.160"	33	24/.134"	28	24/.134"	28
10 37/26	35/.179"	42	35/.179"	42	25/.158"	40	25/.158"	40
8 133/29	40/.248"	81	40/.248"	81	30/.220"	71	25/.220"	71
6 133/27					30/.270"	108	30/.270"	108
4 133/25	42/.370"	180	42/.370"	180	35/.328"	169	35/.328"	169

	DC Resistance Ohms/mft	
AWG/Stranding		
Conductor Type	SPC	NPC
24 19/36	24.3	25.9
22 19/34	15.1	16.0
20 19/32	9.2	9.8
18 19/30	5.8	6.1
16 19/29	4.5	4.8
14 19/27	2.9	3.0
12 19/25	1.8	1.9
10 37/26	1.2	1.2
8 133/29		
6 133/27		

Additional constructions available - check with the factory for details

All figures referenced are nominal

# SAE-AS22759 Extruded ETFE

*Replaces MIL-W-22759/16, /17, /18, /19*

## Construction

Stranded tin plated copper or silver plated high strength alloy  
Extruded ETFE

## Ratings/Approvals

Printed in accordance with SAE-AS22759  
150° C 600 Volts

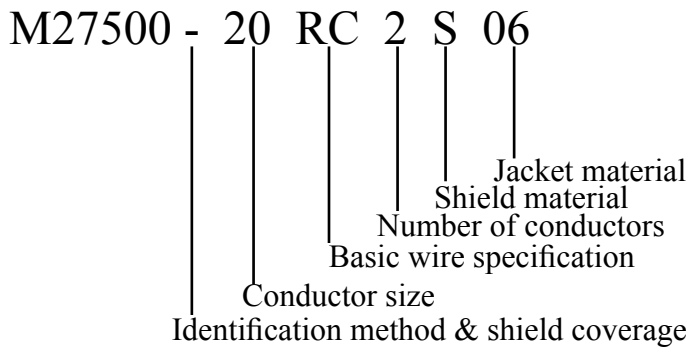
	AS22759/16	AS22759/17	AS22759/18	AS22759/19
Conductor Type	TPC	SPA	TPC	SPA
AWG/Stranding	Mils/OD lbs/mft	Mils/OD lbs/mft	Mils/OD lbs/mft	Mils/OD lbs/mft
26 19/38	-	11/.040" 2	7/.032" 2	6/.032" 2
24 19/36	15/.045" 3	11/.045" 3	7/.036" 2	6/.036" 2
22 19/34	15/.052" 4	11/.052" 4	7/.043" 3	6/.043" 3
20 19/32	15/.060" 5	11/.060" 5	7/.051" 5	6/.051" 5
18 19/30	12/.071" 8	-	7/.061" 6	-
16 19/29	13/.079" 10	-	9/.070" 8	-
14 19/27	13/.093" 15	-	9/.085" 14	-
12 37/28	14/.114" 22	-	11/.107" 21	-
10 37/26	15/.139" 33	-	13/.134" 33	-
8 133/29	18/.199" 62	-	-	-
6 133/27	23/.250" 97	-	-	-
4 133/25	27/.312" 150	-	-	-
2 665/30	29/.388" 250	-	-	-
1 817/30	31/.431" 300	-	-	-
0 1045/30	32/.479" 370	-	-	-
00 1330/30	44/.546" 480	-	-	-

	DC Resistance Ohms/mft	
AWG/Stranding		
Conductor Type	TPC	SPA
26 19/38	41.3	44.8
24 19/36	26.2	28.4
22 19/34	16.2	17.5
20 19/32	9.9	10.7
18 19/30	6.2	-
16 19/29	4.8	-
14 19/27	3.1	-
12 37/28	2.0	-
10 37/26	1.3	-
8 133/29	0.7	-
6 133/27	0.4	-
4 133/25	0.3	-
2 665/30	0.2	-
1 817/30	0.16	-
0 1045/30	0.12	-
00 1330/30	0.09	-

Additional constructions available - check with the factory for details

All figures referenced are nominal

# WC27500 REFERENCE GUIDE



Identification method & shield coverage

Coverage		
85%	90%	
-	C	White insulation w/stripe (Table 1)
A	D	Solid colors (Table 1)
F	H	Red insulation w/stripes (Table 2)
G	J	Solid colors (Table 2)
U	V	Color by procurement

Table 1

1	White	8	Violet
2	Blue	9	Gray
3	Orange	10	Brown
4	Green	11	Blue/Blue
5	Red	12	Orange/Orange
6	Black	13	Green/Green
7	Yellow	14	Red/Red
		15	Black/Black

Table 2

1	Red	8	Orange
2	Blue	9	Violet
3	Yellow	10	Gray
4	Green	11	Red/White
5	White	12	Blue/White
6	Black	13	Yellow/White
7	Brown	14	Green/White
		15	Black/White

Colors same for stripes & solids

Basic Wire Specifications

VA	M22759/5
WA	M22759/6
SA	M22759/7
TA	M22759/8
LE	M22759/9
LH	M22759/10
RC	M22759/11
RE	M22759/12
TE	M22759/16
TF	M22759/17
TG	M22759/18
TH	M22759/19
TK	M22759/20
TL	M22759/21
TM	M22759/22
TN	M22759/23

Shield material

Single	Double	Material
U	--	No shield
T	V	TPC, round
S	W	SPC, round
N	Y	NPC, round
M	K	SPAlloy, round
P	L	NPAAlloy, round
G	A	SPC, flat
H	B	SPAlloy, flat
J	D	TPC, flat
E	X	NPAAlloy, flat

Jacket material

Single	Double	Material
00	00	No jacket
01	51	White PVC
05	55	Clear FEP
06	56	White TFE
09	59	White FEP
14	64	White ETFE
15	65	Clear ETFE
20	70	White PFA
21	71	Clear PFA

**\*Above constructions are those currently manufactured by Harbour Industries**

# NEMA WC 27500 Type TG-14

*Replaces MIL-C-27500*

## Construction

Stranded tin plated copper conductor

Extruded ETFE

Tin plated copper braid 85% coverage

White extruded ETFE jacket

## Ratings/Approvals

Primary conductors manufactured in accordance to SAE-AS 22759

150° C 600 Volts

Standard color coding available

Part Number	AWG/Stranding	Primary Diameter	Shield Diameter	Cable Diameter	Weight/mft
27500-24TG1T14	24 19/36	.036"	.052"	.068"	6
27500-24TG2T14	24 19/36	.036"	.088"	.094"	9
27500-24TG3T14	24 19/36	.036"	.094"	.109"	12
27500-24TG4T14	24 19/36	.036"	.103"	.121"	15
27500-22TG1T14	22 19/34	.043"	.059"	.075"	7
27500-22TG2T14	22 19/34	.043"	.102"	.118"	12
27500-22TG3T14	22 19/34	.043"	.109"	.125"	17
27500-22TG4T14	22 19/34	.043"	.120"	.136"	20
27500-20TG1T14	20 19/32	.051"	.067"	.073"	9
27500-20TG2T14	20 19/32	.051"	.118"	.134"	18
27500-20TG3T14	20 19/32	.051"	.133"	.144"	22
27500-20TG4T14	20 19/32	.051"	.139"	.155"	27
27500-18TG1T14	18 19/30	.061"	.077"	.092"	12
27500-18TG2T14	18 19/30	.061"	.138"	.154"	23
27500-18TG3T14	18 19/30	.061"	.147"	.164"	31
27500-18TG4T14	18 19/30	.061"	.163"	.187"	40
27500-16TG1T14	16 19/29	.070"	.086"	.092"	15
27500-16TG2T14	16 19/29	.070"	.158"	.179"	28
27500-16TG3T14	16 19/29	.070"	.167"	.190"	39
27500-16TG4T14	16 19/29	.070"	.185"	.209"	72
27500-14TG1T14	14 19/27	.085"	.101"	.117"	21
27500-14TG2T14	14 19/27	.085"	.186"	.211"	40
27500-14TG3T14	14 19/27	.085"	.199"	.223"	56
27500-14TG4T14	14 19/27	.085"	.221"	.245"	72
27500-12TG1T14	12 19/25	.107"	.123"	.139"	30
27500-12TG2T14	12 19/25	.107"	.230"	.252"	59
27500-12TG3T14	12 19/25	.107"	.247"	.265"	83
27500-12TG4T14	12 19/25	.107"	.278"	.302"	111

Additional constructions available - check with the factory for details

All figures referenced are nominal



# NEMA WC 27500 Type RC-09

*Replaces MIL-C-27500*

## Construction

Stranded silver plated copper conductor  
Extruded Polytetrafluoroethylene (PTFE)  
Silver plated copper braid 85% coverage  
White extruded FEP jacket

## Ratings/Approvals

Primary conductors manufactured in accordance to SAE-AS 22759  
200° C 600 Volts

Standard color coding available

Part Number	AWG/Stranding	Primary Diameter	Shield Diameter	Cable Diameter	Weight/mft
27500-26RC1S09	26 19/38	.038"	.054"	.073"	6
27500-26RC2S09	26 19/38	.038"	.092"	.110"	10
27500-26RC3S09	26 19/38	.038"	.098"	.116"	13
27500-26RC4S09	26 19/38	.038"	.108"	.126"	16
27500-24RC1S09	24 19/36	.043"	.059"	.075"	7
27500-24RC2S09	24 19/36	.043"	.102"	.118"	13
27500-24RC3S09	24 19/36	.043"	.109"	.127"	16
27500-24RC4S09	24 19/36	.043"	.120"	.138"	19
27500-22RC1S09	22 19/34	.049"	.065"	.083"	10
27500-22RC2S09	22 19/34	.049"	.114"	.132"	15
27500-22RC3S09	22 19/34	.049"	.122"	.138"	20
27500-22RC4S09	22 19/34	.049"	.135"	.153"	25
27500-20RC1S09	20 19/32	.058"	.074"	.090"	11
27500-20RC2S09	20 19/32	.058"	.132"	.150"	20
27500-20RC3S09	20 19/32	.058"	.141"	.156"	27
27500-20RC4S09	20 19/32	.058"	.156"	.180"	35
27500-18RC1S09	18 19/30	.068"	.084"	.102"	15
27500-18RC2S09	18 19/30	.068"	.152"	.176"	28
27500-18RC3S09	18 19/30	.068"	.163"	.187"	38
27500-18RC4S09	18 19/30	.068"	.181"	.205"	47
27500-16RC1S09	16 19/29	.075"	.091"	.109"	17
27500-16RC2S09	16 19/29	.075"	.166"	.190"	33
27500-16RC3S09	16 19/29	.075"	.178"	.202"	46
27500-16RC4S09	16 19/29	.075"	.198"	.222"	59
27500-14RC1S09	14 19/27	.090"	.106"	.124"	23
27500-14RC2S09	14 19/27	.090"	.196"	.220"	45
27500-14RC3S09	14 19/27	.090"	.210"	.235"	62
27500-14RC4S09	14 19/27	.090"	.233"	.258"	79
27500-12RC1S09	12 19/25	.111"	.127"	.145"	33
27500-12RC2S09	12 19/25	.111"	.238"	.262"	68

Additional constructions available - check with the factory for details

All figures referenced are nominal

# SE Cables

## Construction

Stranded silver plated copper conductor  
Extruded Polytetrafluoroethylene (PTFE)  
Silver plated copper braid 85% coverage  
White extruded FEP jacket

## Ratings/Approvals

Primary conductors manufactured in accordance to NEMA HP-3  
200° C 600 Volts

Standard color coding available

Part Number	AWG/Stranding	Primary Diameter	Shield Diameter	Cable Diameter	Weight/mft
1XE24-19/36SE	24 19/36	.043"	.059"	.075"	7
2XE24-19/36SE	24 19/36	.043"	.102"	.118"	13
3XE24-19/36SE	24 19/36	.043"	.109"	.127"	16
4XE24-19/36SE	24 19/36	.043"	.120"	.138"	19
1XE22-19/34SE	22 19/34	.049"	.065"	.083"	10
2XE22-19/34SE	22 19/34	.049"	.114"	.132"	15
3XE22-19/34SE	22 19/34	.049"	.122"	.138"	20
4XE22-19/34SE	22 19/34	.049"	.135"	.153"	25
1XE20-19/32SE	20 19/32	.058"	.074"	.090"	11
2XE20-19/32SE	20 19/32	.058"	.132"	.150"	20
3XE20-19/32SE	20 19/32	.058"	.141"	.156"	27
4XE20-19/32SE	20 19/32	.058"	.156"	.180"	35
1XE18-19/30SE	18 19/30	.068"	.084"	.102"	15
2XE18-19/30SE	18 19/30	.068"	.152"	.176"	28
3XE18-19/30SE	18 19/30	.068"	.163"	.187"	38
4XE18-19/30SE	18 19/30	.068"	.181"	.205"	47
1XE16-19/29SE	16 19/29	.075"	.091"	.109"	17
2XE16-19/29SE	16 19/29	.075"	.166"	.190"	33
3XE16-19/29SE	16 19/29	.075"	.178"	.202"	46
4XE16-19/29SE	16 19/29	.075"	.198"	.222"	59
1XE14-19/27SE	14 19/27	.090"	.106"	.124"	23
2XE14-19/27SE	14 19/27	.090"	.196"	.220"	45
3XE14-19/27SE	14 19/27	.090"	.210"	.235"	62
4XE14-19/27SE	14 19/27	.090"	.233"	.258"	79
1XE12-19/25SE	12 19/25	.111"	.127"	.145"	33
2XE12-19/25SE	12 19/25	.111"	.238"	.262"	68

Additional constructions available - check with the factory for details  
All figures referenced are nominal

# AMPACITY

The ampacity of a conductor represents its current carrying capacity. Generally, as the conductor size increases its resistance decreases resulting in a greater ability to handle current. A by-product of increasing current is increasing heat. Unless the heat is dissipated, enough current can be applied to a conductor to actually melt the metallic conductive material carrying the current. Most certainly, however, the plastic insulating material will decompose at a much lower temperature. To that end current carrying capacity limits have been established by regulatory agencies such as UL and NEC.

A variety of factors were examined in determining the current carrying capacity of an electrical conductor. Among them are conductor size; DC resistance; dielectric softening point; ambient temperature; number of conductors bundled; etc. There are a number of uncontrolled factors that were not examined but must be considered in various application installations, such as air flow; voltage drop; human contact; etc. Probably the most overlooked factor in many applications is the temperature rating of adjacent materials within the installation. For example, some electrical wires will carry a temperature rating of 250°C (482°F). Many electrical connectors and plastic housings are only rated for 60°C (140°F). Consequently, given even a moderate current load the wire will remain intact but surrounding components will melt.

For just this reason the following table is strictly intended to be used as a general guide. Individual applications, whether they be communications, control, power, etc. need to be examined and all appropriate safety factors considered. This table approximates the current carrying capacity of a single 19-strand copper conductor in free air at 30°C (86°F) ambient temperature. Additionally, derating factors for cabled conductors must also be taken into account.

**Insulated Wire Temperature Rating**

AWG	Diameter	60°C	80°C	90°C	105°C	125°C	150°C	200°C	250°C
30	.0124"	1.3	2.0	2.5	3.0	3.5	4.3	4.8	5.9
28	.0146"	2.0	3.0	3.5	4.0	4.5	5.5	6.3	8.0
26	.0188"	3.0	4.0	4.5	5.0	6.0	7.0	9.0	11
24	.0235"	4.5	5.5	6.5	7.0	8.5	10	12	14
22	.0296"	6.0	7.5	9.0	10	11	13	16	20
20	.0376"	8.0	10	12	13	14	18	22	27
18	.0403"	11	14	16	18	19	25	30	36
16	.0531"	16	19	22	24	26	34	38	45
14	.0667"	22	27	30	33	37	45	50	57
12	.0856"	30	36	40	45	50	60	65	75
10	.1080"	40	47	55	58	65	80	90	100
8	.1610"	60	65	75	80	90	105	125	145
6	.2020"	80	95	105	110	125	145	165	205
4	.2550"	105	125	140	155	170	190	220	270
2	.3310"	135	160	180	200	220	240	280	350
1	.3670"	165	195	220	245	270	290	340	430
1/0	.4160"	195	230	260	290	320	340	400	510
2/0	.4690"	225	260	300	330	370	390	465	590

**Derating Factors for Cabled Conductors**

# Cond.	Derate @
2-5	80%
6-15	70%
16-30	50%