

IGS-EL-007(0)

1372

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National Iranian Gas Co.

مدیریت پژوهش و فناوری

Research and Technology Management

امور تدوین استانداردها

Standardization Division

IGS

Iranian Gas Standards

Specification for :

مشخصات فنی :

Cables , Power Part(1)

کابلهای برقی

APPROVED

FOREWORD

This standard is intended to be mainly used by **NIGC** and contractors and has been prepared on interpretation of recognized standards , technical documents , knowledge ,backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Standards (**IGS**) are prepared , reviewed and ammended by technical standard committees within NIGC Standardization Div. and submitted to the **NIGC's "STANDARDS COUNCIL"** for approval .

IGS Standards are subject to revision , amendment or withdrawal , if required , thus the latest edition of **IGS** shall be checked/inquired by **NIGC** users .

This standard must not be modified or altered by the end users within **NIGC** and her contractors. Any deviation from normative references and/or well known manufacturers specifications must be reported to Standardization div.

Any comments from concerned parties on **NIGC** distributed **IGS** are welcome to technical standards committees and will receive serious attention and consideration should a revision to standards is recommended .

GENERAL DEFINITIONS :

Throughout this standard the following definitions , where applicable , should be followed :

1- "**STANDARDIZATION DIV.**" has been organized to deal with all aspects of industrial standards in NIGC . Therefore , all queries for clarification or amendments are requested to be directed to the mentioned div.

2- "**COMPANY** " : refers to national iranian gas company .

3- "**SUPLIER**" : refers to a firm who will supply the service , equipment or material to igs specification whether as the prime producer or manufacturer or a trading firm .

4- "**SHALL**" : is used where a provision is mandatory.

5- "**SHOULD**" : is used where a provision is advised only.

6- "**MAY**" : is used where a provision is completely discretionary.

Website : <http://igs.nigc.ir>

E-mail : nigcigs@nigc.org

پیشگفتار

- ۱- این استاندارد/دستورالعمل بمنظور استفاده اختصاصی در شرکت ملی گاز ایران و شرکتهای فرعی وابسته تهیه شده است.
- ۲- شرکت ملی گاز ایران در مورد نیازهای عمومی از استانداردهای وزارت نفت (IPS) و در مورد نیازهای اختصاصی از استانداردهای اختصاصی خود (IGS) استفاده می نماید.
- ۳- استانداردهای شرکت ملی گاز ایران (IGS) توسط کمیته های تخصصی استاندارد متشکل از کارشناسان بخش های مختلف و یا مشاور تهیه می شود و توسط شورای استاندارد (منتخب هیئت مدیره شرکت ملی گاز ایران) به تصویب میرسند.
- ۴- در تنظیم متن استانداردهای (IGS) از کلیه منابع شناخته شده استاندارد، اطلاعات فنی - تخصصی مربوط به صنایع گاز دنیا، مشخصات فنی تولیدات سازندگان معتبر جهانی و نیز از نتیجه تحقیقات و تجربیات کارشناسان و متخصصان داخلی بر حسب مورد استفاده می شود. همچنین بمنظور استفاده هر چه بیشتر از تولیدات داخلی قابلیت های سازندگان داخلی نیز مورد توجه قرار میگیرد.
- ۵- استانداردها از طریق پایگاه اینترنتی شرکت * و یالوح فشرده (CD) در اختیار واحدها و کاربران قرار می گیرد .
- ۶- استانداردها بطور متوسط هر ۵ سال یکبار و یادر صورت ضرورت زودتر، مورد بازنگری و بروزرسانی قرار میگیرند. بنابراین کاربران باید همیشه آخرین نگارش را مورد استفاده قرار دهند.
- ۷- هرگونه نظر و یا پیشنهاد اصلاح در مورد استانداردها مورد استقبال و بررسی قرار خواهد گرفت و در صورت تأیید، استاندارد مربوطه نیز مورد تجدیدنظر قرار خواهد گرفت .

تعاریف عمومی

در متن استانداردهای (IGS) از تعاریف و اصطلاحات زیر استفاده میشود.

- ۱- "شرکت" (COMPANY): منظور از شرکت "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۲- "فروشنده" (SUPPLIER/VENDOR): به فرد یا موسسه ای اطلاق میگردد که تعهدی رانسبت به شرکت تقبل نموده است.
- ۳- "خریدار" (PURCHASER): منظور از خریدار "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۴- "SHALL": در مواردی بکاربرده میشود که انجام خواسته مورد نظر اجباری است
- ۵- "SHOULD": در مواردی بکاربرده میشود که انجام خواسته مورد نظر ترجیحی و درعین حال اختیاری است
- ۶- "MAY": در مواردی بکاربرده میشود که انجام کار به شکل مورد بحث نیز قابل قبول میباشد

1- **POWER ELECTRICAL WIRES & CABLES**

2-

3- **IGS-ES-EL-007(0) : 1378**

4- **BARE WIRE**

1-1 Over head conductor, hard drawn copper conductor.

1-2 Over head conductor , aluminium alloy stranded conductor (AASC , aldrey).

1-3 Over head conductor , aluminium conductor steel reinforced (ACSR).

1-4 Copper strips.

1-5 Flexible copper braids.

1-6 Resistance wire.

1-7 Guy wire.

5- **WINDING WIRE**

6- **INSULATED WIRES (NON SHEATHED)**

3-1 P.V.C insulated wires (rigid solid conductor)

3-2 P.V.C insulated wires (rigid stranded conductors).

3-3 P.V.C insulated wires (flexible conductors) .

3-4 Rubber insulated wires (welding cable).

7- **INSULATED AND SHEATHED CABLES**

4-1 Heat resistant cable.

4-2 Flexible cable (rubber insulated & rubber sheathed)

4-3 P.V.C/P.V.C power cable .

4-3-1 Flexible P.V.C / P.V.C cables (stranded conductor).

4-3-2 P.V.C / P.V.C cables (solid conductor)

4-3-2 P.V.C / P.V.C cables (stranded for 600/1000v)

4-3-4 P.V.C / P.V.C cables for fixed installations.

4-3-5 Multicore cable. (control cable).

4-4 Cross linked X.L.P.E insulated cables.

4-5 Mineral insulated cable & accessories.

8- ARMOURED INSULATED AND SHEATHED CABLE.

5-1 Underground P.V.C/P.V.C cable .

5-2 Underground P.V.C/P.V.C control cables.

5-3 Single core underground P.V.C/P.V.C cables.

5-4 XLPE underground cables.

5-5 Single core XLPE underground cables.

5-6 Cross link (XLPE) underground cables for 3.6/6 kv

5-7 Cross link (XLPE) underground cables for 8.7/15 kv

5-8 Cross link (XLPE) underground cables for 12/20 kv

**5-9 Cross link (XLPE) underground cables for 12/20 kv
(single core)**

9- THERMOCOUPLE EXTENSION CABLES.

6-1 EXTENSION CABLES FOR TYPE "T" THERMOCOUPLE.

6-2 EXTENSION CABLES FOR TYPE "J" THERMOCOUPLE

6-3 EXTENSION CABLES FOR TYPE "E" THERMOCOUPLE

6-4 EXTENSION CABLES FOR TYPE "K" THERMOCOUPLE

6-5 EXTENSION CABLES FOR TYPE "S" THERMOCOUPLE

1- BARE WIRES

1-1 Over head conductor, bare conductor for over head lines and earthing purposes.

Conductor : stranded hard drawn copper conductor, single core of high conductivity .

To DIN 48201 sheet 1 (1965) of electrolytic copper , certificate of compliance to be submitted .

M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQMM	NO. OF STRANDED AND STRAND DIA.	APROX OVERAL DIA	WEIGHT KG / KM
	KG	16	7/1.7 MM	5.1 MM	143
	“	25	7/2.1 MM	6.3 MM	219
	“	35	7/2.5 MM	7.5 MM	310
	“	50	7/3.0 MM	9.0	447
	“	70	19/2.1 MM	10.5 MM	597
	“	95	19/2.5 MM	12.5 MM	846
	“	120	19/2.8 MM	14.0 MM	1061

1-2

Bare conductor for over head lines.

Conductor aluminium alloy stranded conductors , (AASC, Aldrey) to DIN 48201 sheet 6 (1985) , constructed of heat-treated aluminium- magnesiium – silicon alloy , center wire shall be greased .

M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQMM	NO. OF STRANDS AND STRAND DIA.(MM)	WEIGHT KG/KM
	KG	25	7/2.1	67
	“	35	7/2.5	94
	“	50	19/1.80	135
	“	70	19/2.1	181
	“	95	19/2.5	256
	“	120	19/2.8	322
	“	150	37/2.25	406

1-3

Bare conductor for over head lines.

Conductor : aluminium conductor, steel reinforced (ACSR), to DIN 48204 (1974) .

Constructed of hard – drawn aluminium and zinc coated steel wires (by hot or , electrolytic process).

Greas shall be applied between the layers of stranded wires.

MES NO.	UNIT	NOMINAL CROSS SEC. AREA (SQMM) AC/SR	TOTAL CROSS SEC. AREA (SQMM)	NO.OF STRANDS AND STRAND DIA(MM)		WEIGHT KG/KM
				ALUMINIUM	STEEL	
68-01	KG	25/4	27/8	6/2.25	1/ 2.25	97
	“	35/6	40.0	6/2.70	1/ 2.70	140
	“	50/8	56.3	6/3.2	1/3.2	196
	“	70/12	81.3	26/1.85	7/1.44	284
	“	95/15	109.7	26/2.15	7/1.67	383
	“	120/20	141.4	26/2.44	7/1.90	494
	“	150/25	173.1	26/2.70	7/2.10	605

1-4 Copper strips for earthing and lighting purposes.

Conductor : tinned copper strips of high conductivity and soft drawn.

M.E.S.C	UNIT	THICKNESS	WIDTH
68-80-55-3501	MT	1.0 MM	12.0 MM
68-80-55-3651	“	3.0 MM	20.0 MM
68-80-55-3701	“	3.0 MM	25 MM

1-5 Filexible copper braids . (webbing wire)

Conductor : braids of high conductive electrolytically pure annealed copper wire.

M.E.S.C	UNIT	THICKNESS	WIDTH
6801-23-1121	MT	1.5mm	10mm
6801-23-1201	“	2.0mm	16mm

1-6 Resistance wire.

Conductor : resistance wire , bare nickel chromium alloy .

Class b to BS 115(1954).

Material composition 80% nickel and 20%chromium , with 1.09 ohm Ω per sqmm/m at 20°c.

MESC NO.	UNIT	S.W.G	DIAMETER (mm)
	GM	28 S.W.G	0.38
	“	26 “	0.45
	“	24 “	0.55
	“	23 “	0.60
	“	22 “	0.70

1-7 Guy wire

Steel rope (Guy wire) , for over-head lines single leg, constructed of galvanized steel stranded rope . with steel core , to BS 1290 (1983).

MESC NO.	ROPE DIAMETER (mm)	SAFE WORKING LOAD (SWL) TON
68	8	0.822
68	9	1.0
	10	1.3
	11	1.5
	12	1.8
	13	2.1
	14	2.5
	16	3.3
	18	4.1

2- WINDING WIRE

Conductor : enamelled round copper , to IEC 317-1(1970) .

Made of electrolytic high conductivity copper wire to IEC 182 .

Insulation : synthetic enamel , suitable for class “ H “ (180° C) ACC.

To IEC 317-8 (1990)

To be tested according to IEC 251-1 (1978) grade 2.

M.E.S.C	UNIT	NOMINAL DIAMETER OF CONDUCTOR (mm)	MAX. OVERAL DIAMETER(mm)
68		0.050	0.068
		0.112	0.143
		0.160	0.199
		0.180	0.222
		0.200	0.245
		0.224	0.272
		0.250	0.301
		0.280	0.334
		0.315	0.371
		0.355	0.414
		0.400	0.462
		0.450	0.516
		0.500	0.569
		0.560	0.632

M.E.S.C	NOMINAL DIAMETER OF CONDUCTOR (mm)	MAX. OVERAL DIAMETER(mm)
68	0.630	0.706
	0.710	0.790
	0.750	0.832
	0.800	0.885
	0.850	0.937
	0.900	0.990

	0.950	1.041
	1.000	1.093
	1.060	1.155
	1.120	1.217
	1.180	1.279
	1.250	1.351
	1.320	1.423
	1.400	1.506
	1.500	1.608
	1.600	1.711
	1.700	1.813
	1.800	1.916
	1.900	2.018
	2.00	2.120
	2.500	2.631
	3.000	3.142

3-

INSULATED WIRES (NON-SHEATHED)

3-1 Power cable for use as fixed installations in or on lighting fittings and inside appliances , switchgear and controlgear.

Conductor : Plain annealed copper , solid conductor.

To class 1 of IEC 228(1966)

Insulation : P.V.C

Element : Single core of high conductivity.

Electrical data: 450 v/ 750 v

Approval : To IEC 227-3(1979) or ISIRI 607 (1975).

RED COLOUR		
M.E.S.C	UNIT	CROSS SEC. AREA SQmm

68	MT	1.5 2.5 4.0 6.0 YELLOW COLOUR
68	MT	1.5 2.5 4.0 6.0 BLUE COLOUR
68	MT	1.5 2.5 4.0 6.0 BLACK COLOUR
68	Mt	1.5 2.5 4.0 6.0

		GREEN COLOUR
68	MT	1.5 2.5 4.0 6.0
		BROWN COLOUR
68	MT	1.5 2.5 4.0 6.0

3-2 Fowercable suitable for switchgears and conduits wiring.

**Conductor : Plain annealed copper rigid stranded
conductor. To class 2 of IEC 228 (1966)**

insulation : P.V.C .

Element : Single core of high conductivity.

Electrical data : 450 v / 750 v

Approval : To IEC 227-3(1979)

RED OR PINK COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQ MM	NO. OF STRANDS AND STRAND DIA.(MM)
68	MT	1.5	7/0.50
		2.5	7/0.67
		4.0	7/0.85
		6.0	7/1.04
		10.0	7/1.35
		16.0	7/1.70
		25.0	7/2.14

YELLOW COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQ mm	NO. OF STRANDS AND STRAND DIA.(mm)
68	MT	1.5	7/0.50
		2.5	7/0.67
		4.0	7/0.85
		6.0	7/1.04
		10.0	7/1.35
		16.0	7/1.70
		25.0	7/2.14

BLUE COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQ mm	NO. OF STRANDS AND STRAND DIA.(mm)
68	MT	1.5	7/0.50
		2.5	7/0.67
		4.0	7/0.85
		6.0	7/1.04
		10.0	7/1.35
		16.0	7/1.70
		25.0	7/2.14

GREEN OR YELLOW / GREEN COLOUR			
68	MT	1.5	7/0.50
		2.5	7/0.67
		4.0	7/0.85
		6.0	7/1.04
		10.0	7/1.35
		16.0	7/1.70
		25.0	7/2.14

BLACK COLOUR			
68	MT	1.5	7/0.50
		2.5	7/0.67
		4.0	7/0.85
		6.0	7/1.04
		10.0	7/1.35
		16.0	7/1.70
		25.0	7/2.14

3-3 Power cable suitable for switchgears and controlgears.

Conductor : plain annealed copper , flexible conductor to class 5 of IEC 228 (1966) .

Insulation : P.V.C

Element : single core of high conductivity .

Electrical data: 450 v/750 v

Approval : to IEC 227-3 (1979)

RED COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQmm	NO OF STRANDS AND STRAND DIA(mm)

68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30
		10.0	80/0.40
		16.0	126/0.40
		25.0	196/0.40
		35.0	276/0.40
		50.0	396/0.40

BLACK COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQmm	NO OF STRANDS AND STRAND DIA(MM)
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30
		10.0	80/0.40
		16.0	126/0.40
		25.0	196/0.40
		35.0	276/0.40
		50.0	396/0.40

BLUE COLOUR			
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30

BROWN COLOUR			

68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30

YELLOW COLOUR			
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30

GREY COLOUR			
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30

GREEN OR GREEN YELLOW			
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30
		10.0	80/0.40
		16.0	126/0.40
		25.0	196/0.40
		35.0	276/0.40
		50.0	396/0.40

VIOLET COLOUR			
M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQmm	NO OF STRANDS AND STRAND DIA(mm)
68	MT	1.0	32/0.20
		1.5	30/0.25
		2.5	50/0.25
		4.0	56/0.30
		6.0	84/0.30

3-4Welding cable

Conductor : plain annealed copper , flexible stranded conductor , suitable for maximum conductor temperature of 85°c with code designation of 245 IEC 82

Insulation : heavy duty polychloroprene rubber (neoprene) as one layer.

Element : single core of high conductivity.

M.E.S.C	MT	NOMINAL CROSS SEC. AREA SQmm	NO OF STRANDS AND STRAND DIA(mm)
3-4-1		70	APPROX 2214/0.20

4-

INSULATED AND SHEATHED CABLE

4-1-1 Heat resistant cable for continuous operating temperature of max. 150° c .

Conductor : tinned annealed copper , flexible conductor to class 5 of IEC 228 (1966).

Insulation : heat resistant rubber.

Element : single and twisted twin core of high conductivity .

Sheath : glass fibre braided.

Electrical data 300 v/ 500 v

Approval : to IEC 245-3 (1980) or BS 6500 (1984)

M.E.S.C	NOMINAL CROSS SEC. AREA SQmm SINGLE CORE	NO OF STRANDS AND STRAND DIA(mm)
	0.75	24/0.20
	1.0	32/0.20
	1.5	30/0.25
	2.5	50/0.25
TWISTED TWIN CORE		
	0.75	24/0.20
	1.0	32/0.20
	1.5	30/0.25
	2.5	50/0.25

4-1-2 Heatresistant cable for continious operating temperature of max 150°c .

Conductor : tinned annealed copper , flexible conductor to class 5 of IEC 228 (1966) .

Insulation : heat resistant rubber

Element : single and twisted core of high conductivity.

Sheath : glass fibre braided.

Electrical data 300 v/ 500 v .

Approval : to IEC 245 (1980) or BS 6007 (1983)

M.E.S.C	UNIT	NOMINAL CROSS SEC. AREA SQmm	NO. OF STRANDED AND STRAND DIA. (mm)
		SINGLE CORE	
		4.0	56/0.30
		6.0	84/0.30
		TWISTED TWIN CORE	
		4.0	56/0.30
		6.0	84/0.30

4-2 Flexible cable to be used for portable , puroposes.

Suitable material and water well.

Conductor : tinned annealed copper of plain copper covered with a tape made of , stranded conductor of high conductivity to IEC 228 class 5.

Insulation : rubber oil resistant

Sheath : polychloroprene rubber (P.C.P) oil resistant , circular .

electrical data 450 v/750 v .

approval : to IEC 245 or BS 6007 table 5 .

M.E.S.C	UNITS	NO. OF CORES AND CROSS SEC	NO OF STRANDED AND DIA . (mm)
68	MT	2X4 SQ mm	56/0.30
		2 X 6 “ “	84/0.30
68	MT	3 X 4	56/0.30 mm
		3 X 6	84/0.30
		3 X 10	80/0.40
		3 X 16	126/0.40
		3 X 25	195/0.40
68	MT	4X4 SQmm	56/0.30
		4 X 6 “	84/0.30
		4 X 10 “	80X0.40
		4 X 16 “	126/0.40
		4 X 25 “	195/0.40
		4 X 35 “	275/0.40
		4 X 50”	396/0.40
4 X 70 “	360/0.50		

4-3 P.V.C/P.V.C / power cable

4-3-1 flexible P.V.C / P.V.C cable

Conductor : annealed copper , stranded conductor of high conductivity . acc. To IEC 228 class 5

Insulation : P.V.C

Sheath : P.V.C , circular

Electrical data : 300 v/ 500 v

Approval : acc. To VDE 0250 (nymhy-type) or IEC 227 -5

M.E.S.C	UNIT	NO. OF CORES AND CROSS SEC. AREA.	NO OF STRANDED AND DIA METER(MM)
68	MT	2x 1.5 SQmm	30/0.25 mm
		2x 2.5 SQ mm	50/0.25 “
68	MT	3X1.5 SQmm	30/0.25 mm
		3 x 2.5 SQmm	50/0.25 “
68	MT	4 x1.5 SQmm	30/0.25 mm
		4 x 2.5 SQmm	50/0.25 “

4-3-2

power P.V.C/PVC . cable

conductor : annealed copper , solid conductor of high conductivity. Acc. To IEC 228 class 1 .

Insulation : P.V.C.

Sheath : P.V.C CIRCULAR

Electrical data: 300 v/500 v

Approval : acc to VDE 250 nymhy-type or IEC 227-4

M.E.S.C	UNIT	NO OF CORES AND CROSS SEC. AREA
68	MT	2 x 1.5 SQMM
	“	2 x 2.5 SQ MM
68	MT	3 x 1.5 SQMM
	“	3 x 2.5 SQMM
68	MT	4 x 1.5 SQMM
	“	4 x 2.5 SQMM

4-3-3

power P.V.C/PVC . cable

conductor : plain annealed copper , stranded conductor of high conductivity. Acc. To IEC 228 class 2 .

Insulation : P.V.C.

Element : single core

Sheath : P.V.C circular

Electrical data: 600 v/ 1000v

Approval : acc to VDE 0271 .

M.E.S.C	CORE CROSS SEC. AREA SQmm	NO. OF STRANDED AND STRAND DIA.	SHEATH COLOUR
68	10 mm²	7/1.35 mm	BLACK
	10 mm²	7/1.35 mm	RED
	16 mm²	7/1.70 mm	BLACK
	16 mm²	7/1.70mm	RED
	25 mm²	7/2.14 mm	BLACK
	25 mm²	7/2.14 mm	RED
	35 mm²	19/1.55 mm	BLACK
	35 mm²	19/1.55 mm	RED
	70 mm²	19/2.17 mm	BLACK
	70 mm²	19/2.17mm	RED
	95 mm²	19/- mm	BLACK
	120 mm²	19/- mm	BLACK
	150 mm²	37/-mm	BLACK
	185 mm²	37/- mm	BLACK
	240 mm²	37/- mm	BLACK
300 mm²	37/- mm	BLACK	

4-3-4

Power cable P.V.C/PVC . for fixed installations.

conductor : plain annealed copper , stranded conductor of high conductivity. Acc. To IEC 228 class 2 .

Insulation : extruded P.V.C.

Sheath : P.V.C

Electrical data: 450 v/ 750v

Approval : acc to IEC 227 .

Cable marking : type , name , numbers and size of conductor , and voltage grade to be embossed on the sheath.

M.E.S.C	UNIT	TWO CORE
68	MT	2 x 1.5 SQmm
	“	2.5 SQmm
	“	4 SQmm
	“	6 SQmm
	“	10 SQmm
	“	16 SQmm

M.E.S.C	UNIT	THREE CORE FOR THREE PHASES APPLICATION
68	MT	1.5 SQmm
	“	2.5 SQmm
	“	4 SQmm
	“	6 SQmm
	“	10 SQmm
	“	25 SQmm
	“	35 SQmm
	“	50 SQmm
	“	70 SQmm

M.E.S.C	UNIT	THREE CORE FOR THREE PHASES APPLICATION
68	MT	95 SQmm
	“	120 SQmm

M.E.S.C	UNIT	FOUR CORE :FOR THREE PHASE AND NEUTRAL APPLICATION
		<p>1.5 SQmm</p> <p>2.5 SQmm</p> <p>4.0 SQmm</p> <p>6.0 SQmm</p> <p>10.0 SQmm</p> <p>16 SQmm</p> <p>25 SQmm</p> <p>35/16 SQmm</p> <p>50 /25 SQmm</p> <p>70/35 SQmm</p> <p>95/50 SQmm</p> <p>120/70 SQmm</p> <p>150/70 SQmm</p> <p>185/95 SQmm</p> <p>240/120 SQmm</p> <p>300/150 SQmm</p> <p>300/185 SQmm</p> <p>400/185 SQmm</p>

4-3-5

Multicore cable , (control cable)

conductor : plain annealed copper , stranded conductor of high conductivity. To IEC 228 class 2 .

Insulation : extruded P.V.C.

Sheath : P.V.C

Element : multicore identified by numbers.

Electrical data: 300 v/ 500v AC.

Cable marking : manufacturer name , type , numbers and size of the conductor and voltage grade to be embossed on the sheath.

Approval : acc to IEC 227 .

M.E.S.C	UNIT	NO. OF CORES AND CROSS. SEC. SQmm
68	Mt	7 x 2.5
	“	10 x 2.5
	“	19 x 2.5

4-4 Cross linked XLPE cable for cathodic protection application.

Conductor : plain annealed copper , stranded conductor of high conductivity . to IEC 228 class 2.

Insulation : polyethylene (XLPE).

Sheath : P.V.C. circular

Electrical data : 600 v/ 1000v AC.

Approval : acc , to IEC 502 .

Single core

M.E.S.C	UNIT	CORE CROSS SEC. AREA SQmm	NO. OF STRAND AND DIA. MM	SHEATH COLOUR
68	MT	16 SQMM	7/1.70	BLACK
	“	16 SQMM	7/1.70	RED
	“	25 SQMM	7/2.13	BLACK
	“	25 SQMM	7/2.13	RED
	“	35 SQMM	19/1.53	BLACK
	“	35 SQMM	19/1.53	RED
	“	50 SQMM	19/1.83	BLACK
	“	50 SQMM	19/1.83	RED
	“	70 SQMM	19/2.17	BLACK
	“	70 SQMM	19/2.17	RED

4-5 Mineral insulated cable .

Conductor : plain annealed copper , solid conductor of high conductivity . to BS 1036 or BS 1037.

Insulation : shall be consist of compressed mineral powdered.

Sheath : shall consist of plain annealed copper ,
solid drawn . to BS 1172 .

Outer sheath : Orange P.V.C covering , flame resistant ,
tested to BS 4066

Electrical : 500 volt light duty .

Approval : acc . to BS 6207-1 or IEC 702-1 .

M.E.S.C	UNIT	NO. OF CORES AND CROSS. SEC. SQmm
68	Mt	2 x 1.5 SQmm
	“	2 x 2.5 SQmm
	“	2 x 4.0 SQmm
		3 x 1.5 SQmm
		3 X 2.5 SQmm
		4 X 1.5 SQmm
		4 x 2.5 SQmm

A = ACCESSORIES FOR MINERAL CABLES

A-1 Cable glands for mineral cables flame proof for div,1, group IIB ,
according to BS 6081 for 500 volt mineral cable . all metal parts
of brass , dimensions acc . to BS 4568 , complete with lock nuts
, and lock washers. authorities certification shall be submitted.

M.E.S.C	UNIT	NOMINAL SIZE OF ENTRY THREAD
68	MT	20 mm

A-2 Seal packs kits , contains : brass pots , sleeves , and others compounds , suitable for 150°c .

M.E.S.C	UNIT	FOR MINERAL CABLE SIZES
68	Mt	2 x 1.5 SQmm
	“	2 x 2.5 SQmm
	“	2 x 4.0 SQmm
		3 x 1.5 SQmm
		3 X 2.5 SQmm
		4 X 1.5 SQmm
		4 x 2.5 SQmm

A-3 Straight through joints assy. For mineral cables.

M.E.S.C	UNIT	FOR CABLE SIZES
68	No	2 x 1.5 SQmm
	“	2 x 2.5 SQmm
	“	2 x 4.0 SQmm
		3 x 1.5 SQmm
		3 X 2.5 SQmm
		4 X 1.5 SQmm
		4 x 2.5 SQmm

A-4 Shroud P.V.C for mineral cables glands tapered end , standard colour orange .

M.E.S.C	UNIT	DESC.
68	NO.	20mm , suitable for 20 mm . mineral cables glands

A- TOOLS FOR MINERAL CABLES AND ACCESSORIES.

B-1 rotary stripper for mineral cables adjustable size up to 23 mm out side DIA . cable .

M.E.S.C	UNIT	DESC.
68	NO	SUITABLE FOR 23 MM OUTSIDE DIA.

		CABLE.
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B-2 Pot wrench suitable for 20 mm mineral cable gland .

M.E.S.C	UNIT	DESC.
68	NO	20 mm cable gland

B-3 Crimping tool expandable for crimping 20mm pot.

M.E.S.C	UNIT	DESC.
68	NO	20 mm mineral cable gland

B-4 Bending lever, for mineral cables up to 11 mm outside diameter.

M.E.S.C	UNIT	DESC.
68	NO	11mm dia. Mineral cable

B- Sealing compound for mineral cables. Weather proof suitable for operating temperature up to 150° c .

M.E.S.C	UNIT	DESC.
68	NO	In tube or tins approx. 150 gr.

5- ARMoured INSULATED AND SHEATHED CABLES.**5-1 Underground , armoured cable: CU/P.V.C/ S.W.A./P.V.C**

according to BS 6346 and BS 6746

Conductor : plain annealed copper , stranded conductor of high conductivity . class 2 , to BS 6746 .

Insulation : P.V.C

Bedding : P.V.C extruded

Armour : single galvanized steel wire. To BS 1442

Sheath : P.V.C

Electrical data : 600 v/1000 v

Cable marking : type , no. and size of the conductors , and voltage to BS embossed on the over sheath.

5-1-1

TWO CORES

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43	MT	1.5 SQMM
	“	2.5 SQMM
	“	4 SQMM
	“	6 SQMM
	“	10 SQMM
	“	16 SQMM
	“	25 SQMM
	“	35 SQMM
	“	50 SQMM

5-1-2

Three cores

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-46	MT	2.5 SQmm
“	“	4.0 SQmm
“	“	6.0 SQmm
“	“	10.0 SQmm
“	“	16.0 SQmm
“	“	25 SQmm

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-46	MT	35 SQmm
“	“	50 SQmm
“	“	70 SQmm
“	“	95 SQmm
“	“	125 SQmm
“	“	150 SQmm

5-1-3

Four cores

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
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68-46	MT	2.5 SQmm
“	“	4.0 SQmm
“	“	6.0 SQmm
“	“	10.0 SQmm
“	“	16.0 SQmm
“	“	25 SQmm
“	“	35SQmm
“	“	50SQmm
“	“	70SQmm

5-1-4

Four core with reduced neutral conductor

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68	MT	3 x 25 + 16 SQmm
“	“	3 x 35 +16 SQ mm
“	“	3 X 50 + 25 SQmm
“	“	3 X 70 +35 SQmm

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68	MT	3 X 95 + 50 SQmm
“	“	3 X 120 + 70 SQmm
“	“	3 X 150 + 70 SQmm
“	“	3 x 185 +95 SQmm
“	“	3 X 240 + 120 SQmm
“	“	3 X 300 + 150 SQmm
“	“	3 X 400 + 185 SQmm

5-2

Underground control cable . acc. To BS 6346 and BS**6746**

Conductor : plain annealed copper , stranded conductor of high conductivity . class 2 to BS 6360

Insulation : P.V.C with numbered code desig.

Bedding : P.V.C extruded .

Armour : single galvanized steel wire to BS 1442 .

Sheath : P.V.C

Electrical data : 600 v / 1000 v

Cable marking : type , no . and size of the conductors , and core numbered consecutively embossed.

5-2-1 Five – core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43	MT	2.5 SQmm

5-2-2 Seven – core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43	MT	2.5 SQmm

5-2-3 Ten – core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43	MT	2.5 SQmm

5-2-4 Twelve core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43	MT	2.5 SQmm

5-2-5 Nineteen core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43-11	MT	2.5 SQmm

5-2-6 Twenty seven core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43-11	MT	2.5 SQmm

5-2-7

Thirty seven core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43-11	MT	2.5 SQmm

5-2-8

Fourty seven core

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43-11	MT	2.5 SQmm

5-3 Single core underground armoured cables , acc. To BS 6346 and BS 6746 .

Conductor : plain annealed copper , stranded conductor class 2 to BS 6360

Insulation : P.V.C .

Element : single core of high conductivity.

Bedding : P.V.C extruded .

Armour : single nonmagnetic material wire.

Sheath : P.V.C

Electrical data : 600 v / 1000 v

Cable marking : type , no . and size of the conductors , and voltage to be embossed on the sheath.

M.E.S.C	UNIT	CORE CROSS SEC. AREA.
68-43-14	MT	240 SQmm
“	“	300 SQmm
“	“	400 SQmm
“	“	500 SQmm
“	“	630 SQmm

5-4 XLPE underground armoured cables . acc. To BS 5467

Conductor : plain annealed copper , stranded conductor
of high conductivity . class 2 to BS 6360

Insulation : X.L.P .E.

Bedding : extruded P.V.C .

Armour : single galvanized steel wire, to BS 1442.

Sheath : P.V.C

Electrical data : 600 v / 1000 v

Cable marking : type , no . and size of the conductors , and
voltage to be embossed on the sheath.

Two core.

M.E.S.C	UNIT	CORE CROSS SEC, AREA.
68-43	MT	16 SQmm
“	“	25 SQmm
“	“	50 SQmm

Three core

M.E.S.C	UNIT	CORE CROSS SEC, AREA.
68-43	MT	16 SQmm
“	“	25 SQmm
“	“	35 SQmm
“	“	50 SQmm
“	“	70 SQmm
“	“	95 SQmm
“	“	120 SQmm
“	“	150 SQmm
“	“	185 SQmm
“	“	240 SQmm
“	“	300 SQmm

Four core (with reduced neutral)

M.E.S.C	UNIT	NO. OF CORE AND CROSS SEC.
68-43	MT	3 X 25 + 16 SQmm
“	“	3 X 35 + 16 SQmm
“	“	3 X 50 + 25 SQmm
“	“	3 x 70 +35 SQmm
“	“	3 X 95 + 50 SQmm
“	“	3 X 120 + 70 SQmm
“	“	3 X 150 + 70 SQmm
“	“	3 X 185 +95 SQmm
“	“	3 X 240 + 120 SQmm
“	“	3 X 300 + 185 SQmm

5-5

Cross linked underground armoured cables. Acc to BS 5467 and BS 6746.

Conductor : plain annealed copper , stranded conductor class 2 to BS 6360

Insulation : X.L.P .E.

Elemen : single core of high conductivity .

Bedding : P.V.C extruded .

Armour : single non-magnetic matrial wire.

Sheath : P.V.C

Electrical data : 600 v / 1000 v

Cable marking : type , no . and size of the conductors , and voltage to be embossed on sheath.

M.E.S.C	UNIT	CORE CROSS SEC, AREA.
68-43	MT	185 SQmm
“	“	240 SQmm
“	“	300 SQmm
“	“	400 SQmm
“	“	500 SQmm
“	“	630 SQmm

5-6 Cross link underground armoured cables.**According to IEC 502**

**Conductor : plain annealed copper , stranded conductor
Of high conductivity. Acc to IEC 228 class 2 .**

Insulation : X.L.P .E. (polyethylene)

Bedding : P.V.C extruded .

Screen : copper wire screen and counter helix.

Armour : single galvanized steel wire.

Sheath : P.V.C

Electrical data : 3600 v / 6000 v

**Cable marking : type , no. size of conductors , and
voltage to be embossed on the sheath.**

M.E.S.C	UNIT	NO OF CORE AND CROSS SEC. AREA
68-43	MT	3 X 50 SQmm
“	“	3 X 70 SQmm
“	“	3 X 95 SQmm
“	“	3 x 120 SQmm
“	“	3 X 185 SQmm
“	“	3 X 240 SQmm

5-7 Cross link underground armoured cables. According to IEC 502

**Conductor : plain annealed copper , stranded conductor
Of high conductivity. Acc. to IEC 228 class 2 .**

Insulation : X.L.P .E. (polyethylene)

Bedding : P.V.C extruded .

Screen : copper wire screen and counter helix.

Armour : single galvanized steel wire.

Sheath : P.V.C

Electrical data : 8,700 v / 15,000 v

Cable marking : type , No. and size of conductors , and voltage to be embossed on the sheath.

M.E.S.C	UNIT	NO. OF CORE AND CROSS SEC. AREA
68-43	MT	1 X 50 SQmm
“	“	1 X 70 SQmm
“	“	1 X 95 SQmm
“	“	1 x 120 SQmm
“	“	3 X 50 SQmm
“	“	3 X 70 SQmm
“	“	3 x 95 SQmm
“	“	3 X 120 SQmm
“	“	3 X 150 SQmm

5-8 Cross link power cable .

Conductor : plain annealed copper , stranded conductor

Of high conductivity. Acc. to IEC 228 .

Insulation : X.L.P .E. (polyethylene)

Bedding : P.V.C extruded .

Screen : metallic screen for cores.

Armour : galvanized steel wire.

Sheath : P.V.C

Electrical data : 12,000 v / 20,000 v.

Approval : to IEC 502 .

Cable marking : type , no. size of conductors , and voltage to be embossed on the over sheath.

M.E.S.C	UNIT	NO. OF CORE AND CROSS SEC.
68-	MT	3 X 35 SQmm
“	“	3 X 50 SQmm

“	“	3 X 70 SQmm
“	“	3 x 95 SQmm
“	“	3 X 120 SQmm

5-7

Cross link power cable .**Conductor : plain annealed copper , stranded conductor****Of high conductivity. Acc. to IEC 228 .****Insulation : X.L.P .E. (polyethylene)****Bedding : P.V.C. extruded .****Screen : Non- metallic or semi conductor for conductor screen.****Over Sheath : P.V.C.****Electrical data : 12,000 v / 20,000 v.****Approval : to IEC 502 .****Cable marking : size of the conductor , voltage to be embossed on over sheath.**

M.E.S.C	UNIT	NO OF CORE ,CROSS SEC.
68-	MT	1 X 50 SQmm
“	“	1 X 70 SQmm
“	“	1 X 95 SQmm
“	“	1 x 120 SQmm
“	“	1 X 150 SQmm

6-

THERMOCOUPLE EXTENSION CABLES:

6-1

extension cable for type “T “ thermocouple.**Conductor : solid , copper / constantan (CU-NI) .****Insulation : P.V.C. with colour coding according to BS 1843 .****Element : one pair****Bedding : extruded P.V.C.****Screen : metal braided**

Sheath : P.V.C. with colour coding to BS 1843 .

M.E.S.C	UNIT	NO. OF CORE AND DIA. OF CONDUCTOR (mm)
	Mt	1 X 2 X 0.8 (mm)
		1 X 2 X 1.3 (mm)

6-2

Extension cable for type “ J “ thermocouple.

Conductor : solid , iron / constantan (CU-NI)

Insulation : P.V.C. with colour coding according to BS 1843 .

Element : one pair

Bedding : extruded P.V.C.

Screen : metal braided

Sheath : P.V.C. with colour coding according. To BS 1843 .

M.E.S.C	UNIT	NO. OF CORE AND DIA. OF CONDUCTOR (mm)
	Mt	1 X 2 X 0.8 (mm)
		1 X 2 X 1.3 (mm)

6-3

Extension cable for type “ E “ thermocouple.

Conductor : solid , nickel – chromium/ constantan (CU-NI)

Insulation : P.V.C. with colour coding according to BS 1843 .

Element : one pair

Bedding : extruded P.V.C.

Screen : metal braided

Sheath : P.V.C. with colour coding according. To BS 1843 .

M.E.S.C	UNIT	NO. OF CORE AND DIA. OF CONDUCTOR
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		(mm)
	Mt	1 X 2 X 0.8 (mm)
		1 X 2 X 1.3 (mm)

6-4

Extension cable for type “ K “ thermocouple.

Conductor : solid , nickel-chromium / nickel-aluminium.

**Insulation : P.V.C. with colour coding according to BS
1843 .**

Element : one pair

Bedding : extruded P.V.C.

Screen : metal braided

**Sheath : P.V.C. with colour coding according. To BS
1843 .**

M.E.S.C	UNIT	NO. OF CORE AND DIA. OF CONDUCTOR (mm)
	MT	1 X 2 X 0.8 (mm)
		1 X 2 X 1.3 (mm)

6-5

Extension cable for type “ S “ thermocouple.

Conductor : solid , copper- copper / nickel(alloy)

**Insulation : P.V.C. with colour coding according to BS
1843 .**

Element : one pair

Bedding : extruded P.V.C.

Screen : metal braided

**Sheath : P.V.C. with colour coding according. To BS
1843 .**

M.E.S.C	UNIT	NO. OF CORE AND DIA. OF CONDUCTOR (mm)
	MT	1 X 2 X 0.8 (mm)
		1 X 2 X 1.3 (mm)

