الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

20-SDMS-02

REV. 03 (27-05-2018)

SPECIFICATION FOR OVERHEAD LINE ACCESSORIES

Saudi Electricity Company

1. SCOPE

This SEC Material Standard Specification (SDMS) specifies the minimum technical requirement for design, engineering, manufacturing, inspection, testing and performance of accessories for overhead lines to be used in the medium and low voltage system (MV/LV) of Saudi Electricity Company (SEC).

2. CROSS REFERENCES

The Material Standard Specification shall be read in conjunction with SEC General Specification No. 01-SDMS-01 (latest revision) for General Requirement for all Equipment/Materials as an integral part of this SDMS.

This SDMS shall also be read in conjunction with SEC purchase order requirements.

3. APPLICABLE CODES AND STANDARDS

The latest revision of the following codes and standards shall be applicable for the equipment/materials covered in this SDMS. In case of any deviation, the vendor/manufacturer may propose equipment/materials conforming to alternate codes or standards. However, the provisions of SEC Standards shall supersede the provisions of these alternate standards in case of any difference.

Table 1: List of applicable standards

Standard number	Title
ASTM A6	Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use
ASTM A36M	Standard Specification for Carbon Structural Steel
ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless
ASTM A121	Standard Specification for Zinc Coating (Galvanized) Steel Barbed Wire
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings of Iron and Steel Products
ASTM A143	Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A239	Standard Test Method for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength
ASTM A354	Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

Standard number	Title
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A384	Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
ASTM A385	Standard Practice for Providing High Quality Zinc Coatings (Hot-Dip)
ASTM A475	Standard Specification for Zinc-Coated Steel Wire Strand
ASTM A510	Standard Specification for General requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A563M	Standard Specification for Carbon and Alloy Steel Nuts (Metric)
ASTM A687	Standard Specification for High-Strength Non-Headed Steel Bolts and Studs
ASTM B6	Specification for Zinc (Slab Zinc)
ASTM B98	Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes
ASTM B139	Standard Specification for Phosphor Bronze Rod, Bar and Shapes
ASTM B140	Standard Specification for Copper-Zinc-Lead (Red Brass or Hardware Bronze) Rod, Bar and Shapes
ASTM B150	Standard Specification for Aluminum Bronze Rod, Bar and Shapes
ASTM B209M	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B249	Standard Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar and Shapes
ASTM B580	Specification for Anodic Oxide Coatings on Aluminum
ASTM E165	Standard Test Method for Liquid Penetrant Examination
ASTM E376	Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods
ASTM F436M	Standard Specification for Hardened Steel Washers
ASTM F541	Standard Specification for Alloy Steel Eyebolts
ASTM F568	Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners
ASTM F606	Standard Test Materials for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers and Rivets
ASTM F3125M	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120ksi (830MPa) and 150ksi (1040MPa) Minimum Tensile Strength, Metric Dimensions
AISC	Manual of Steel Construction, 14th Edition
ANSI B1.13M	Metric Screw Threads
ANSI B18.2.4.6	Metric Heavy Hex Nuts

Standard number	Title
ANSI B18.22.1	Plain Washers
ANSI C135.1	Galvanized Steel Bolts and Nuts for Overhead Line Construction
ANSI C119.4	Electric Connectors – Connectors for Use Between Aluminum-to-Aluminum or Aluminum-to-Copper Bare Overhead Conductors
AWS D1.1	Structural Welding Code, Steel
BS 183	General Purpose Galvanized Steel Wire Strand
BS 464	Thimbles for Wire Ropes
BS 3692	ISO Metric Precision Hexagon Bolts, Screws and Nuts
BS 3288	Specification for Insulators and Conductor Fittings for Overhead Power Lines
BS 4102	Steel Wire for Fences
BS 4360	Specification for Weldable Structural Steels
DIN 40500	Copper for Electrical Purposes
EN 13605	Copper and Copper-Alloys – Copper Profiles and Profile Wire for Electrical Purposes
EN 50086	Flexible Non-Metallic Conduit System
EN 50189	Conductors for Overhead Lines – Zinc Coated Steel Wires
IEC 61284	Overhead Lines – Requirements and Tests for Fittings
IEC 61386	Flexible Non-Metallic Conduit System
IEC 62561-1	Lightning Protection System Components (LPSC) – Part 1: Requirements for Connection Components
IEC 62561-2	Lightning Protection System Components (LPSC) – Part 2: Requirements for Conductors and Earth Electrodes
IEEE C135.2	Threaded Galvanized Ferrous Strand-Eye Anchor Rods and Nuts for Overhead Line Construction
ISO 630	Standards for Structural Steels
ISO R657	Recommendation for Hot-Rolled Steel Sections
ISO 1459	Metallic Coatings - Protection
ISO 1460	Metallic Coatings - Hot-Dip Galvanized Coatings on Ferrous Materials - Gravimetric Determination of the Mass per Unit Area
ISO 1461	Metallic Coatings - Hot Dip Galvanized Coatings on Fabricated Ferrous Products - Requirements
ISO 3575	Continuous Hot-Dip Zinc-Coated Carbon Steel Sheet of Commercial, Lock-Forming and Drawing Qualities
ISO 4997	Cold-Reduced Steel Sheet of Structural Quality

Standard number	Title
ISO 4998	Continuous Hot-Dip Zinc-Coated Carbon Steel Sheet of Structural Quality
ISO 7413	Hexagon Nuts for Structural Bolting, Style 1, Hot-Dip Galvanized (Oversize Tapped) - Product Grades A and B - Property Classes 5, 6 and 8
ISO 7417	Hexagon Nuts for Structural Bolting - Style 2, Hot-Dip Galvanized (Oversize Tapped) - Product Grade A - Property Class 9
NEMA CC 3	Standard Connectors for Use Between Aluminum or Aluminum-to-Copper Bare Overhead Conductors
NEMA GR 1	Grounding Rod Electrodes and Grounding Rod Electrode Couplings
SASO/SSA 39	Mechanical Testing of Welded Joints
SASO/SSA 107	Tensile Testing of Steel
SASO/SSA 157	Charpy Method of Impact Test on Metals
SASO/SSA 199	Methods of Tests for Steel Wire Ropes
SASO/SSA 200	Steel Wire Ropes for General Purposes

4. SERVICE CONDITIONS AND SYSTEM PARAMETERS

The overhead line accessories shall be suitable for operation under the service conditions and system parameters given in the latest revision of SEC General Specification No. 01-SDMS-01.

5. DESIGN AND CONSTRUCTION REQUIREMENTS

5.1. GENERAL

5.1.1. All accessories associated with distribution poles for the installations of insulators, conductors, stays, transformer, grounding, etc. are included in this specification. These broadly include but are not limited to the materials listed in Table 2.

5.1.2. The overhead line accessories shall be of manufacturer's standard design and shall meet or exceed the performance requirements of this specification in all respects.

5.1.3. Manufacturer's drawings, as required by 01-SDMS-01, shall show the details of the overhead line accessories, together with all pertinent dimensions. Any variations in these dimensions due to manufacturing tolerances shall be indicated.

5.1.4. All the materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein.

5.1.5. Workmanship and general finish shall be of the highest grade and the best modern practice.

Table 2: List of overhead line accessories

Brief description	Application	Fig. No.	Page No.
Crossarm, L 100x100x12x2400	Mounting of insulators	1	39
Fuse Cutout Mounting Channel	Transformer installation	2	40
Fuse Cutout Mounting Channel	Transformer installation	2A	41
Transformer Mounting Channel	Transformer installation	3	42
Brace, L 50x50x4x828	Crossarm installation	4	43
Brace, L 50x50x4x828	Crossarm installation	4A	44
Earthwire Suspension Support	Earth conductor installation	5	45
Earthwire Support Assembly	Earth conductor installation	6	46
Double Arming Plate, 100x12x700	Double crossarm installation	7	47
Horizontal Insulator Mounting Bracket	Vertical line configuration	8	48
Spool Insulator Bracket	LV quadruplex installation	9	49
Pole Band (Stay Clamp) For Octagonal Steel Pole	Stay wire installation	10	50
Anti-Climbing Device, Barbed Wire	Steel pole installation	13	51
Buckle Locking Clip, Barbed Wire	Steel pole installation	13A	52
Machine Bolt, M16	Fastener	14	53
Machine Bolt, M20	Fastener	15	54
Shoulder Eye Bolt, M16	Suspension insulator and LV conductor attachment	16	55
Shoulder Eye Bolt, M20	Suspension insulator and LV conductor attachment	17	56
Eye Nut For M16	Suspension insulator and LV conductor attachment	18	57
Eye Nut For M20	Suspension insulator and LV conductor attachment	19	58
Anchor Shackle	Suspension insulator attachment	20	59
Clevis Eye Extension	Suspension insulator attachment	21	60
Anchor Rods Thimble Eye	Stay wire installation	22	61
Anchor Rods Twin Eye	Stay wire installation	22A	62
Steel Plate For Anchor Rod	Stay wire installation	23	63
Preformed Guy Grip	Stay wire installation	26	64

5.2. FABRICATED STEEL SHAPES AND PLATES

5.2.1. The name or type of fabricated steel shapes or plates shall be as specified in technical data schedule of this specification.

5.2.2. All fabricated steel shapes and plates shall be strictly in conformity with the dimensions, arrangements, sizes, weights and thickness indicated on the drawings or stipulated in the specifications.

5.2.3. Unless otherwise specified, the steel material shall comply with the applicable requirements of ASTM A36 or equivalent with minimum yield strength of 250N/mm^2.

5.2.4. All fabricated steel shapes and plates shall be hot-dipped galvanized in accordance with the requirement of 01-SDMS-01 with the minimum average coating thickness of 0.086 mm (equivalent to 610 g/m^2).

5.2.5. Bolts, nuts and washers to be furnished, as component parts of fabricated materials, shall comply with the requirements in Clause 5.3 of this specification. Cotter pins and keys shall comply with the requirements in Clause 5.5 of this specification.

5.2.6. The service drop steel pipe shall be made from circular seamless and hot-dipped galvanized steel, schedule 40, conforming to ASTM A53, Grade A, or equivalent.

5.2.7. Shearing and cutting shall be performed carefully and all portions of the work shall be finished neatly.

5.2.8. All forming and bending during fabrication shall be done by method that will prevent embrittlement or loss of strength in the material being worked.

5.2.9. Weld material shall be compatible with the material of the fabricated steel as defined by American Welding Society and all welding operations shall be done in accordance with the American Welding Society, AWS D1.1 or equivalent.

5.2.10. Holes shall be cut, drilled, or punched at right angles to the surface and shall not be made or enlarged by burning. Holes shall be clean cut without torn or ragged edges, and burrs resulting from the drilling or reaming operations shall be removed.

5.2.11. All fabricated materials shall conform to the tolerances specified in the AISC Manual and ASTM A6 or equivalent. In particular, the tolerances are as follows:

- +/- 2 mm for center-to-center distance between holes
- +/- 0.5 mm for diameter of pre-drilled holes

5.3. BOLTS, NUTS, WASHERS, AND ANCHOR RODS

5.3.1. The type of machine bolts, shoulder eyebolts, eye nuts, anchor rods, etc. shall be as specified in technical data schedule of this specification. The required standard lengths of machine bolts are given in Table 3.

5.3.2. The bolts, nuts, washers and anchor rods shall be of manufacturer's standard design and shall meet the basic dimensional and performance requirements of this specification in all respects.

5.3.3. Bolts, nuts and anchor rods shall be made from hot-rolled steel which has been produced by the open hearth, basic oxygen or electric furnace process and which is of a grade and quality suitable to meet the requirements of this specification.

5.3.4. Machine bolts shall be high strength Grade 8.8 and shall comply with the applicable requirements of ASTM F3125M or equivalent.

5.3.5. Nuts shall comply with the applicable requirements of ASTM A563M or equivalent.

5.3.6. Bolts, nuts and washers shall be hot-dipped galvanized in accordance with the requirement of 01-SDMS-01 with minimum average coating thickness of 0.053 mm, equivalent to 381 g/m².

5.3.7. Galvanized bolts, nuts shall be free from burrs, seams, laps and irregular surfaces that affect serviceability.

5.3.8. The top of the bolt head or nut shall be flat and the edges shall be chamfered or rounded. The thread end of the bolts shall be chamfered or rounded.

5.3.9. All machine bolt heads and nuts shall be regular hexagonal and shall be in accordance with ANSI B18.2.4.6M or equivalent.

5.3.10. The thread and threaded hole of nut shall match the thread of the bolt. The external threaded portion of all bolts shall, after galvanizing, be in such condition that nuts tapped will fit the galvanized bolt so that the nut can run the entire length of the thread without the use of tools.

5.3.11. Washers shall be in accordance with ANSI B18.22.1, ASTM F436M or equivalent.

5.3.12. The galvanized ferrous shoulder eyebolts and nuts shall be in accordance with ASTM F541 or equivalent. Shoulder eyebolts shall be forged in one-piece without welds. Welding in manufacturing process of the shoulder eyebolts is not acceptable.

5.3.13. The galvanized ferrous eyenuts shall be in accordance with ANSI C135.5 or equivalent.

5.3.14. Unless otherwise specified, each machine bolts and shoulder eyebolts shall be furnished with one (1) nut, two (2) flat washers, and one (1) spring washer assembled thereon.

5.3.15. All galvanized steel bolts shall be marked with the property class symbol and with the manufacturer's identification symbol. For machine bolts, markings shall be located on the top of the head and may be raised or recessed. When raised, markings shall project not less than 0.10 mm for 12 mm and smaller bolts, and 0.20 mm for 16 mm and larger bolts above the surface of the head.

5.3.16. The anchor rods and associated nuts shall be in accordance with IEEE C135.2 or equivalent. The anchor rod shall be galvanized steel with drop-forged thimble eye or twin eye at one end with a thread length of 100 mm at the other end.

5.3.17. Each anchor rod shall be furnished with two (2) nuts and two (2) 3mm thick flat washers assembled thereon.

5.3.18. The anchor rod length and diameter shall be stamped below the eye of each anchor rod.

Table 3: Summary of bolts sizes

Type of Installations	Structure	Pole Height (m)	Machine Bolt Length (mm)		Shoulder Eye Bolt Length (mm)	
			M16	M20	M16	M20
LV Single Circuit	INT & MAP	10	140	-	-	-
	HAP, TER, TAP-OFF (2 WAYS)	10	-	-	170	-
MV Single Circuit	INT, LAP, MAP, HAP, SEC & TER	12, 13,	-	235 & 255	-	-
		14, 15				
	COMPOSITE STRUCTURE	12, 13,	-	-	265	-
		14, 15				
MV Double Circuit	INT, LAP, MAP, HAP, SEC & TER	14, 15	-	255 & 300	-	-
LV Single Circuit	INT & MAP	10	275	-	-	-
Self-Support	HAP, TER, TAP-OFF (2 WAYS)	10	-	-	295	-
MV Single Circuit Self-Support	INT, LAP, MAP, HAP, SEC & TER	12, 13,	-	335 & 370	-	-
		14, 15				
	COMPOSITE STRUCTURE	12, 13,	-	-	415	-
		14, 15				
Fixing of L - 100 x 100 x 12 x 2400 for Post Insulator @ H-Pole		10	140	-	-	-
		12	-	235	-	-
		13	-	255	-	-
Fixing of C - 125 x 65 x 6 x 2400 for Fuse Cutout @ H-Pole		10		170	-	-
		12	-	255	-	-
		13	-	270	-	-
Fixing of Transformer Mounting C 150 x 75 x 75 x 6.5 x 2400 @ H-Pole		10	-	260	-	-
		12	-	320	-	-
		13	-	345	-	-
Fixing of L - 100 x 100 x 12 x 2400 for LV Cabinet @ H-Pole		10	-	330	-	-
		12	-	375	-	-
		13	-	400	-	-
LV Line at H-Pole Structure		10	-	-	170	-
		12, 13	-	-	265	-
Fixing of Brace or Double Arming Plate			-	60	-	-
Mounting of Transformer at Support Channel and LV Cabinet at Angle			60	-	-	-

5.4. STAY WIRE AND PREFORMED GUY GRIP

5.4.1. The stay wire and preformed guy grip shall be of manufacturer's standard design and shall meet the basic dimensional and performance requirements of this specification in all respects.

5.4.2. The nominal overall diameter of the stay wire strand shall be 12 mm and with seven (7) numbers of 4.00 mm diameter wires in the strand. The stay wire shall have a minimum breaking strength of 101kN.

5.4.3. The stay wire strand shall be utilities grade steel wire. The base metal shall be made by the open-hearth, basic oxygen, or electric furnace process. The steel wire strands shall be coated with zinc conforming to ASTM B6 or equivalent. The galvanized coating shall be Class C with minimum coating weight of 824 g/m² as specified in ASTM A475 or equivalent.

5.4.4. The strand direction of lay shall be left-hand lay and shall be reversed in successive layer.

5.4.5. All stay wires shall be stranded with uniform tension. Stranding shall be sufficiently close to ensure no appreciable reduction in diameter when stressed to 10 percent of the specified strength.

5.4.6. The 7-wire strand shall consist of a center wire with a 6-wire layer concentrically twisted over it with a uniform pitch of not more than 16 times the specified nominal diameter of the stay wire.

5.4.7. All wires in the strand shall lie naturally in their true position in the completed strand. They shall tend to remain in position when the strand is cut at any point or be readily replaced by hand and then remain in position.

5.4.8. Joints or splices shall be made only in individual wires before drawing to final size or in the finished wires composing the strand. Joints made in individual finished wires shall be acceptable provided there is no more than one joint in any 45 m section of the completed stay wire and the location of each joint is marked on the stay wire with paint or some other distinguishing mark.

5.4.9. It shall be supplied in length not less than 2000 meters per reel, there shall be no joints or splices in any length of the completed stay wire.

5.4.10. The stay wire shall be free from imperfections and consistent with good commercial practices.

5.4.11. The elongation of the high strength stay wire in 610 mm length shall not be less than 5 per cent. Elongation shall be observed while applying tension load and reading shall be taken when the fracture occurs.

5.4.12. The individual wires in the stay wire shall conform to the nominal diameter of coated wires with a permissible tolerance of plus or minus 0.13 mm.

5.4.13. The preformed guy grip shall be made of galvanized steel material compatible with the 12 mm diameter galvanized steel stay wire strand specified in this specification. The lay direction of preformed helical rods shall be left hand and the preformed guy grip shall be provided with cross over mark indicating the starting point of application and identification label showing the manufacturer's catalog number and strand diameter range.

5.5. HARDWARE FITTINGS FOR INSULATORS AND CONDUCTORS

5.5.1. The type of insulator and conductor hardware fittings shall be as specified in technical data schedule of this specification.

5.5.2. The hardware fittings shall be of manufacturer's standard design and shall meet the basic dimensional and performance requirements of this specification in all respects.

5.5.3. The dimensions, strength ratings and overall design of hardware fittings shall be compatible with the applicable conductors and other related fabricated metal shapes and plates.

5.5.4. The anchor shackle, clevis eye extension and guy thimble, except for cotter keys, shall be made of a good commercial grade of malleable iron, ductile iron or steel. The cotter keys shall be made of stainless steel.

5.5.5. The body and keeper of strain and suspension clamps shall be aluminum alloy. The U-bolts, nuts and cotter pin shall be galvanized steel. The cotter keys shall be made of stainless steel.

5.5.6. The wedge grip shall be made of aluminum alloy except for the removable bail, which shall be a stainless steel.

5.5.7. The hardware with clevis ends shall be furnished with a positive locking device of the cotter key type or bolted type.

5.5.8. The contours, edges and corners of the hardware fittings shall be rounded to eliminate areas of high corona stress concentration.

5.5.9. Stainless steel split cotter keys shall be humped to maintain the key in the locked or unlocked positions and shall have prongs spread to prevent withdrawal from the socket.

5.5.10. Each hardware fitting shall bear a marking identifying the manufacturer's name or trademark, manufacturer's catalog number, strength rating, and year of manufacture.

5.5.11. The preformed ties and preformed armor rods shall be compatible with the ACSR/AW conductors to which they will be applied. The lay direction of preformed helical rods shall be the same as that of the outer layer of the conductor to which it is applied. The preformed ties and armors shall be provided with identification label showing the manufacturer's catalog number, insulator details and conductor diameter range.

The preformed armor rods shall be made of aluminum alloy and is resistant to oxidation throughout its shelf life.

5.5.12. The stainless steel strap and the semi rigid PVC sleeve shall be supplied in a handy weather proof packaging, and shall be in rolls of 50 meters each.

5.5.13. Hardware fittings for insulators and conductors shall be type tested in accordance with the applicable requirements of IEC 61284 or equivalent.

5.6. CONNECTORS

5.6.1. The types of connectors shall be as specified in technical data schedule of this specification. The types of connectors are, but not limited to, full tension sleeve, repair sleeve, insulated sleeve, parallel groove compression connector, bolted-type parallel grove connectors, terminal lug, and terminal plug.

5.6.2. All connectors shall be tin-coated with a minimum thickness of 20µm.

5.6.3. The connectors shall be designed to conform to the type, size and ampacity ratings of the conductors joined.

5.6.4. The tensile rating of the full tension sleeve shall be ninety five percent (95%) of the applicable ASTM rated strength of the weaker of the conductors being joined.

5.6.5. The tensile rating of the minimum tension connector such as the insulated sleeve, parallel groove compression connector, terminal lug, terminal plug, C-Tap and ground rod clamp shall be five percent (5%) of the applicable rated strength rating of the weaker conductors being joined, but not less than 889 Newton for conductor larger than 13.30 mm^2.

5.6.6. The full tension sleeve connectors shall be compression type and made of aluminum anodic oxide coated in accordance with ASTM B580.

5.6.7. The full tension sleeve for ACSR/AW conductors shall be one-piece compression type and shall be pre-filled with conductive oxide inhibiting compound then capped with plastic plugs.

5.6.8. The repair sleeve shall be compression type, made of cast aluminum and U-shaped.

5.6.9. The parallel groove connector shall be compression type made of high conductivity E-aluminum alloy, H-shaped with bendable tabs to secure conductors, pre-filled with conductive oxide inhibiting compound then capped with plastic plugs, and individually packed.

5.6.10. Bolted-type parallel groove connectors shall be made of high conductivity E-aluminum alloy and shall be provided with all stainless steel fasteners (bolts, nuts, and washers). The grooves shall be knurled to facilitate breaking the surfaces of the conductors to enhance contact and improve grip, then applied with conductive oxide inhibiting compound.

5.6.11. The terminal lug for ACSR or aluminum conductors shall be compression type and made of tin plated E-aluminum. The barrels shall be prefilled with conductive oxide inhibiting compound then capped with plastic plugs, as per latest revision of 12-SDMS-02 Cable Lugs and Connectors.

5.6.12. The terminal plug for ACSR or aluminum conductors shall be compression type and made of aluminum with tin plated copper plug. The connector bores shall be pre- filled with conductive oxide inhibiting compound then capped with plastic plugs. The plug shall be bendable to desired angle for easier insertion to equipment terminals.

5.6.13. The insulated sleeve shall be compression type and made of aluminum connector with nylon jacket to insulate electrically and protect against water and weather. The barrel of connector sleeve shall be pre-filled with conductive oxide inhibiting compound then capped with plastic plugs.

5.6.14. Overhead line connectors shall be type tested in conformance with the applicable requirements of ANSI C119.4 or equivalent.

5.6.15. To facilitate proper identification during installation, the Manufacturer's Name or trademark, Manufacturer's Catalog number, SEC Item Code, Die Index Number, Conductor Size, Knurl Locations and Start/Stop Knurl shall be marked in legible and indelible ink on each connector.

5.7. ANTI-CLIMBING DEVICE

5.7.1. The anti-climbing device shall be of the type shown in Fig. No. 13.

5.7.2. The nominal diameter of the barbed wire strand shall be 2.5 ±0.1 mm. The barbed wire shall have a minimum breaking strength of 4.23kN.

5.7.3. The barbed wire shall be carbon steel in accordance with ASTM A510, Grade 1040 and galvanized as per ASTM A121.

5.7.4. Barbed wire shall consist of two (2) twisted strands with four (4) barbs (points) spaced not more than 125 mm apart. Strand wires shall be twisted with uniform length of lay. The direction of twisting may be in one direction or alternatively in left and right direction.

5.7.5. Barbs (points) length measured from the center of the two (2) strand wires shall be 9.5 mm (minimum).

5.7.6. The barbed wire shall be packed on spools of 300 meters in length.

5.8. GROUNDING RODS AND ACCESSORIES

5.8.1. The grounding rods provided in this specification shall be sectional type. The rods are rolled threaded at each end and can be joined together with couplings.

5.8.2. The grounding rod shall be made of solid steel core bonded uniformly with copper through an electrolytic process. The copper shall be deposited over a layer of nickel to ensure adherence between the copper layer and the steel core. The steel core shall not be less than 98% iron and when tested in accordance with ASTM A370 shall have mechanical tensile strength of not less than 650 N/mm². The copper coating shall be 99.5% pure copper with minimum coating thickness of 0.25 mm per ASTM E376. The inter-layer of nickel is 99.5% nickel and a minimum thickness of 3.0µm.

5.8.3. The grounding rod coupling shall be made of Silicon Aluminum Bronze with Copper Alloy UNS No. C-642000 per ASTM B150 and ASTM B249, counter bored to enclose fully the threads on the rods. The design shall ensure that when assembled, there will be direct rod-to-rod contact.

5.8.4. The grounding rod driving head shall be of high strength steel Grade 8.8 complying with applicable requirements of ASTM A325M, threaded to fit the grounding rod coupling. The design shall ensure that there is direct driving head to rod contact when the rod driving force is applied. The driving head shall be suitable for re-use.

5.8.5. The grounding rod, grounding rod coupler, and driving head shall be supplied pre-assembled as one item.

5.8.6. The tinned copper-bonded steel grounding conductor per Figure-43A is made of 10mm round solid steel core bonded uniformly with copper through and electrolytic process. The copper shall be deposited over a layer of nickel to ensure adherence between copper layer and the steel core.

The tinned copper-bonded steel grounding conductor shall be supplied as coils in 20m lengths. Each coil has a diameter and height that is not exceeding 90cm and 10cm respectively, and shall be secured firmly using high tensile low elongation steel straps at two (2) opposite ends along the coil diameter.

Coils shall be packaged and piled-up as two (2) concentric rings in a strong wooden pallet at a maximum height and weight of 1.0m and 1,000kg respectively, then secured firmly using high tensile low elongation steel straps.

The minimum coating thickness of the following metallic layers shall be as follows:

SN	Metallic Layer	Coating Thickness, µm
1	Nickel (Ni)	4.0
2	Copper (Cu)	70.0
3	Tin (Sn)	3.0

5.8.7. The crimpit connector shall be C-shaped compression type and made from pure annealed 99.9% copper per EN 13605 or equivalent.

5.8.8. The ground rod clamp shall be mechanical type connector with U-bolt and hexagonal nut made of Silicon Bronze with Copper Alloy UNS No. C-65100 per

ASTM B98, body made of Phosphor Bronze with Copper Alloy UNS No. C-54400 per ASTM B139 and ASTM B140, round washer made of Copper Plated Brass, and the spring washer made of Stainless Steel Grade SS 304.

5.8.9. The grounding rods and all grounding accessories shall be type tested respectively according to applicable requirements of IEC 62561-1 and IEC 62561-2 or equivalent industry standards.

5.9. DANGER, NUMBERING, AND PHASING PLATES

5.9.1. The danger, numbering and phasing plates shall be manufactured from flat sheet aluminum per BS 1470.

5.9.2. The danger sign plate for MV equipment shall show a white “skull and crossbones” and “DANGER HIGH VOLTAGE” in Arabic and English marking on red background on 150 mm x 150 mm x 1.5 mm aluminum plate as shown in Fig. No. 49.

5.9.3. The danger sign plate for LV equipment shall be manufactured on 100 mm x 100 mm x 1.5 mm aluminum plate as shown in Fig. No. 49A.

5.9.4. The numbering plates shall consist of a number tag holder and number tags as shown in Fig. No. 51. The number tag holder shall be black painted aluminum size 400mm (maximum) x 50mm x 1mm and shall be provided with flanges to accommodate the 48 mm x 20 mm tags. The number plates shall be yellow painted aluminum size 48 mm x 20 mm with the cut through numbers or letters.

5.9.5. The sizes of phasing plates shall be Ø80 mm x 1.5 to 2.0 mm thick and with black colored letters “A”, “B” or “C” on a Red, Yellow or Blue background, respectively, as shown in Fig. No. 53.

5.9.6. Paint shall be high gloss baked enamel finish. This shall include a transparent lacquer capable of blocking the ultraviolet rays of sun and preventing their discoloring influence.

5.9.7. The plates shall have rounded corners and no sharp or rough edges.

5.10. NON-METAL ACCESSORIES

5.10.1. The other accessories included in this Specification are guy wire guard, ground wire guard and flexible conduit.

5.10.2. The guy wire guard shall be half-round and yellow colored (RAL 1003 Signal Yellow), made of ultra-violet stabilized and high impact resistance PVC. The guy wire guard shall be furnished with galvanized steel clamps located at the top, the middle and lower end for attachment to 12 mm diameter stay wire strand as shown in Fig. No. 28.

5.10.3. The ground wire guard shall be made of rigid, high impact PVC formulation and the dimensions are as shown in Fig. No. 47.

5.10.4. The flexible conduits shall be made of black polyamide PA6, UV protected per UL 1660 Section 5.12, flame-retardant per UL 94: V2, low toxicity, low smoke, self-extinguishing per IEC 61386-1 Clause 13.1.3 contains no halogen, Sulphur or Phosphorus. The compressive strength shall be 120kg across a sample measuring 100mm in length with a maximum allowable deformation on outside diameter of 25% and should display self-recovery to its original shape.

5.10.5. The flexible conduit assembly shall be in compliance with IEC EN 61386-23, flexible systems with classification 34434 with details shown in Fig. No. 62, 62A, and 62B.

5.10.6. The thermoplastic pipes such as PVC, PE, or equivalent material shall be plain, Gray in color, weather resistant, dimensions as shown in Fig. No. 59A, minimum temp of the thermal properties should be not less than 90 C˚.

5.10.7. The cable tie shall be self-locking type and made of polyamide or nylon, black color and UV resistance.

6. INSPECTION AND TESTING

In addition to the requirements specified in 01-SDMS-01, the following shall be fulfilled:

- The supplier shall make adequate routine tests and inspections to determine the conformity of materials furnished under this specification.

6.1. INSPECTION/ROUTINE TEST REQUIREMENTS

6.1.1. Inspection/routine tests shall be in accordance with the applicable standards in this specification.

6.1.2. Visual inspection shall include checks for satisfactory workmanship, materials, freedom from surface defects and for compliance with the purchase order and the general specifications.

6.1.3. SEC designated representative shall have free access at any time while work is being carried on, to all areas of the manufacturer's plant, which concern the work.

6.1.4. Inspection/routine tests may be made on all stages of production and shipping.

6.1.5. SEC or its designated representative reserve the right to conduct acceptance testing at the manufacturer's plant or take random samples after delivery to test the products at SEC approved 3rd party laboratory to verify compliance with this specification.

6.2. TYPE TESTING REQUIREMENTS

All materials covered in this specification shall be type tested at SEC approved laboratory or at manufacturer's test facility witnessed by SEC designated representative, in accordance with the requirement of the latest standards specified in this specification provided the manufacturer's test facility is certified and/or the tests are supervised by representatives of SEC approved laboratories.

Following the completion of all tests, two certified copies of the test reports, including the mill test certificate, approved fabrication drawings, and material standard compliance certificate demonstrating that the materials used conforms in the standards specified in this specification, shall be submitted to SEC for review and approval. The following type tests shall be carried out:

6.2.1. Fabricated steel shapes and plates shall be type tested in accordance with the following standards:

- Steel materials suitable for use in fabrication of steel shapes and plates shall conform in the applicable requirements of ASTM A36.
- Hot-dipped galvanizing tests in accordance with ASTM or ISO or equivalent standards referenced in this specification shall be carried out for all galvanized materials, including the threads of the bolts.
- Design, shape and dimensional verification as per applicable drawings in this specification.

- Fasteners (nuts. bolts, and washers) included as part of the assembly shall be tested as per applicable standards.
- Service drop steel pipes shall conform in the applicable requirements of ASTM A53 (Grade A).
- Weldments shall conform in the requirements of AWS D1.1 or equivalent.
- Unless otherwise specified in this specification, tolerances shall conform in the requirements of ASTM A6 or equivalent industry standards.

6.2.2. Bolts, nuts, washers, and anchor rods shall be type tested in accordance with the following standards:

- Machine bolts shall conform in the requirements of ASTM F3125M.
- Hexagonal nuts and machine bolt heads shall conform in the requirements of ANSI B18.2.4.6 or equivalent.
- Washers shall conform in the requirements of ASTM F436M or equivalent.
- Shoulder eyebolts shall conform in the requirements of ASTM F541 or equivalent.
- Eyenuts shall conform in the requirements of ANSI C135.5 or equivalent.
- Anchor rods shall conform in the requirements of IEEE C135.2 or equivalent.

6.2.3. Stay/guy wires and preformed guy grips shall be type tested in accordance with the following standards:

- Steel wire strands suitable for use as stay/guy wires shall conform in the requirements of ASTM A475 (Class C) or equivalent.
- Stay/guy wires shall conform in the requirements of EN 50189 or equivalent.

6.2.4. Insulators and conductors hardware fittings shall be type tested in accordance with IEC 61284.

6.2.5. Connectors shall be type tested in accordance with ANSI C119.4 or equivalent.

6.2.6. Barbed-wires (Anti-Climbing Device) shall be type tested in accordance with the applicable requirements of ASTM A510.

6.2.7. Ground rods and grounding accessories shall be type tested respectively in accordance with IEC 62561-1 and IEC 62561-2.

6.2.8. Flat sheet aluminum suitable for use in danger plates, numbering plates and phasing plates shall be type tested in conformance with ASTM B209M or equivalent.

6.2.9. Non-metallic accessories shall be type tested in accordance with the following standards:

- UV Resistance in conformance with UL 1660 requirements.
- Flame-retardant in conformance with UL 94 requirements.
- Low-toxicity, low-smoke, and self-extinguishing properties in conformance with IEC 61386-1 requirements.
- Flexible conduit assemblies shall conform in the requirements of IEC 61386.

7. PACKING AND SHIPMENT

In addition to the packing and shipping requirements specified in 01-SDMS-01, the following shall be fulfilled:

- Items consisting of two or more parts such as bolts with nuts and washers shall be delivered, as far as possible, fully assembled/packed as one set.

- The stay wire shall be furnished in lengths shown in the Data Schedule and packed in wooden or steel reals and lagged externally. Wood lagging or better material shall be secured with steel straps to provide physical protection during transit and customary storage and handling operations.

8. GUARANTEE

- The vendor shall guarantee the materials against all defects arising out of faulty design, sub-standard materials or poor workmanship for a period of five (5) years from date of delivery.

- The vendor shall guarantee that the materials that will be delivered in SEC warehouses are uniform and consistent with the approved samples. SEC reserves the right to blacklist the vendor and/or the manufacturer should they be proven guilty of supplying sub-standard materials and not uniform or consistent with the approved samples.

- If no exceptions to this specification are taken and no list of deviations is submitted, it shall be deemed that, in every respect, all items offered shall conform to this specification. SEC interpretation of this specification shall be accepted.

9. SUBMITTALS

In addition to documentations specified in 01-SDMS-01, the following shall be submitted by the vendor/manufacturer:

- Detailed working/fabrication drawings shall be supplied with the proposals. The drawing shall include but not limited to the following:
  - The complete dimensions and location of bolt holes.
  - Details of connections, bends, shaping and cuts.
  - Details of identification marks or numbers.
  - Type tests and routine tests reports for metallic and non-metallic products shall be submitted during evaluation of tender.

- Submittals required following award of contract:
  - Samples together with actual CAD drawings, routine test reports, and materials certificate of compliance with applicable standards shall be submitted for inspection/evaluation prior to issuance of approval for mass production. The following attributes shall be checked:
    a. Dimensional verification
    b. Engraved markings (SEC Item Code, Manufacturer Logo or Initials, Manufacturer Catalogue/Product Number)
    c. Uniformity of the product/samples
    d. Finishing
  - Manufacturing schedule, progress report and test schedules.
  - Test reports including, but not limited to, the following:
    - Certified mill test reports for all material
    - Certified welding reports, if applicable
    - Test reports on coating thickness, nuts & bolts and reports on dimensional checks
    - Report of all material testing, when required, including photos, diagrams, etc.

10. TECHNICAL DATA SCHEDULE

Table 4: Overhead line accessories – 5.2 Fabricated steel shapes and plates

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.2.1	Name/Description of Fabricated Material		
5.2.2	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.2.2	Shape of Steel Material		
5.2.3	Standard Designation/Grade of Steel		
5.2.3	Minimum Yield Stress of Steel Material, N/mm²	250	
5.2.2	Dimensions (mm)		
	Strength Rating (kN)		
5.2.4	Galvanize Coating Weight, g/m²	610	
5.2.5	Grade of Component Machine Bolts and Cotter Pins		
5.2.5	Component Machine Bolts Galvanize Coating Weight, g/m²	381	
5.2.5	Component Cotter Keys	Stainless Steel	
	Manufacturing Standard Specification		
	Total Weight (after galvanization)		
	Quantity Required		

Table 5: Overhead line accessories – 5.3 Bolts, nuts, and washers

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.3.1	Type of Bolt		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.3.1	Diameter, mm		
5.3.1	Length, mm		
	Threaded Length, mm		
	Coarse of Thread		
	Eye Size (Shoulder Eyebolt and Eye nut)		
5.3.4	Grade or Strength Rating		
5.3.6	Galvanize Coating Weight, g/m²	381	
5.3.14	Number of Nuts		
5.3.14	Number of Washers		
	Manufacturing Standard Specification		
5.3.15	Markings		
	Quantity Required		

Table 6: Overhead line accessories – 5.3 Anchor rods

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.3.1	Type of Anchor Rod		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.3.1	Diameter, mm		
5.3.1	Length, mm		
5.3.16	Material	Galvanized Steel	
	Length of Thread		
	Eye Dimensions		
	Strength Rating, kN		
5.3.6	Galvanize Coating Weight, g/m²	381	
5.3.17	Number of Nuts		
	Manufacturing Standard Specification		
5.3.18	Markings		
	Quantity Required		

Table 7: Overhead line accessories – 5.4 Stay wire strand

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.4.2	Nominal Diameter of Strand, mm	12.0	
5.4.2	Number of Wires in Strand	7	
5.4.2	Nominal Diameter of Individual Wires, mm	4.0	
5.4.2	Minimum Breaking Strength, kN	101	
5.4.3	Material	Galvanized Steel	
5.4.3	Galvanize Coating Weight, g/m²	824	
5.4.4	Lay Direction	Left Hand	
	Manufacturing Standard Specification		
	Type of Reel		
	Length per Reel		

Table 8: Overhead line accessories – 5.4 Preformed guy grip

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.4.13	Compatible With 12.0 mm Stay Wire Strand Nominal Diameter	Yes	
5.4.13	Material	Galvanized Steel	
5.4.13	Construction Form	Preformed Helical Rods	
5.4.13	Number of Helical Rods per Set		
5.4.13	Diameter of Rods, mm		
5.4.13	Lay Direction	Left Hand	
5.4.13	Applied Length, mm		
5.4.13	Holding Strength Rating		
5.4.13	Galvanize Coating Weight, g/m²		
	Markings		
	Manufacturer's Catalog No.		
	Quantity Required		

Table 9: Overhead line accessories – 5.5 Insulator and conductor hardware fittings

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.5.1	Hardware Fitting Type		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.5.4 5.5.5 5.5.6	Material		
5.5.3	Dimensions (mm)		
5.5.7	Cotter Pin Diameter, mm		
5.5.7	Cotter Key	Stainless Steel	
5.5.3	Strength Rating (kN)		
	Galvanize Coating Weight, g/m²	610	
	Manufacturing Standard Specification		
5.5.10	Markings		
	Total Weight (after galvanization)		
	Quantity Required		

Table 10: Overhead line accessories – 5.6 Connectors

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.6.1	Connector Type		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.6.2	Associated Conductor Material		
5.6.2	Associated Conductor Cross Sectional Area		
5.6.2	Associated Conductor Diameter		
5.6.2	Tin Coating Thickness	20µm	
5.6.5 5.6.8 5.6.9	Material of Connector		
.	Dimensions (Before Compression), mm		
	Associated Conductor Size		
	Die Index Number		
5.6.3 5.6.4	Mechanical Strength Rating (kN)		
5.6.2	Current Rating (Amperes)		
	Manufacturing Standard Specification		
	Quantity Required		

Table 11: Overhead line accessories – 5.8 Grounding rods

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.8.1	Type of Grounding Rod	Sectional	
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
	Diameter, mm		
	Length, mm		
5.8.2	Material	Copper Bonded Steel	
5.8.5	Thickness of Copper Coating, mm	0.254	
	Thickness of Nickel (Inter-layer), µm	3.0	
5.8.1	Length of Threaded Ends		
5.8.3	Grounding Rod Coupling Material	Silicon Aluminum Bronze	
	Grounding Rod Coupling Length, mm	80	
5.8.4	Grounding Rod Driving Head Material	High Strength Steel, Grade 8.8	
	Grounding Rod Driving Head Length, mm	40	
	Manufacturing Standard Specification		
	Markings		
	Quantity Required		

Table 12: Overhead line accessories – 5.8 Grounding Accessories

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.8.6	Type of Grounding Accessories		
	SEC Fig. No.	43A	
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
	Diameter, mm	10.14	
	Length, m	20	
5.8.6	Material	Copper Bonded Steel	
5.8.6	Tin Coating Thickness	3.0µm	
	Thickness of Copper Coating	70µm	
	Thickness of Nickel (Inter-layer)	4.0µm	
	Manufacturing Standard Specification		
	Markings		
	Quantity Required		

Table 13: Overhead line accessories – 5.9 Danger, numbering, and phasing plates

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
5.9	Type of Sign Plate (Danger, Numbering or Phasing)		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
5.9.1	Material		
	Fixing Dimensions		
5.9.5	Paint Finish	High Gloss Baked Enamel	
	Manufacturing Standard Specification		
	Quantity Required		

Table 14: Overhead line accessories – 5.10 Non-metal accessories

SEC Inquiry No: Item No:

No	Description	SEC Specified Values	Vendor proposed values**
	Name/Description of Non-Metal Accessories		
	SEC Fig. No.		
	Manufacturer's Drawing No.		
	Manufacturer's Catalog No.		
	Dimensions (mm)		
	Color		
5.10.3 5.10.4	Material		
5.10.5 5.10.6	Thermal properties		
	Mechanical properties		
	Manufacturing Standard Specification		
	Quantity Required		

Overhead line accessories

- Additional Technical Information or Features Specified by SEC

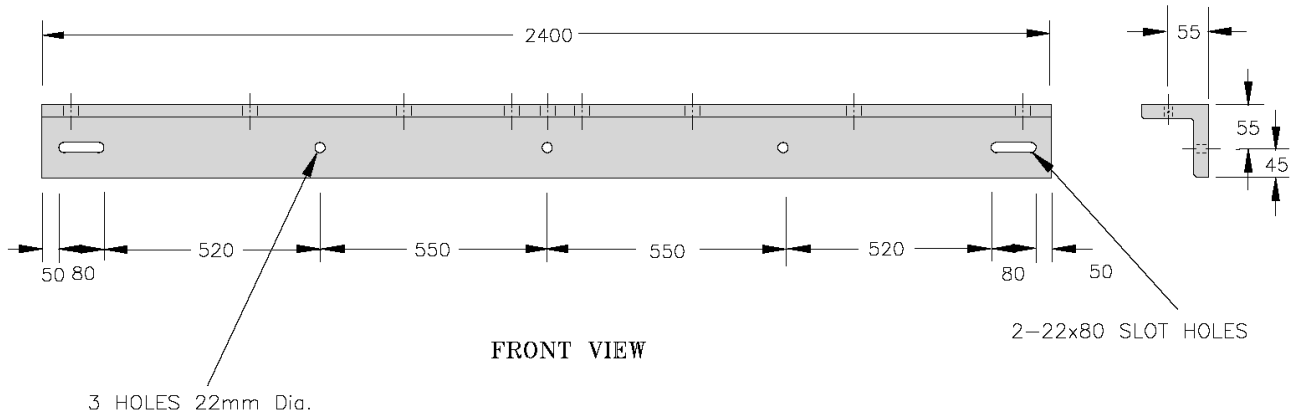
- Additional Supplementary Data or Features Proposed by Bidder/Vendor/Supplier.

- Other Particulars to be filled-up by the Bidder/Vendor/Supplier.

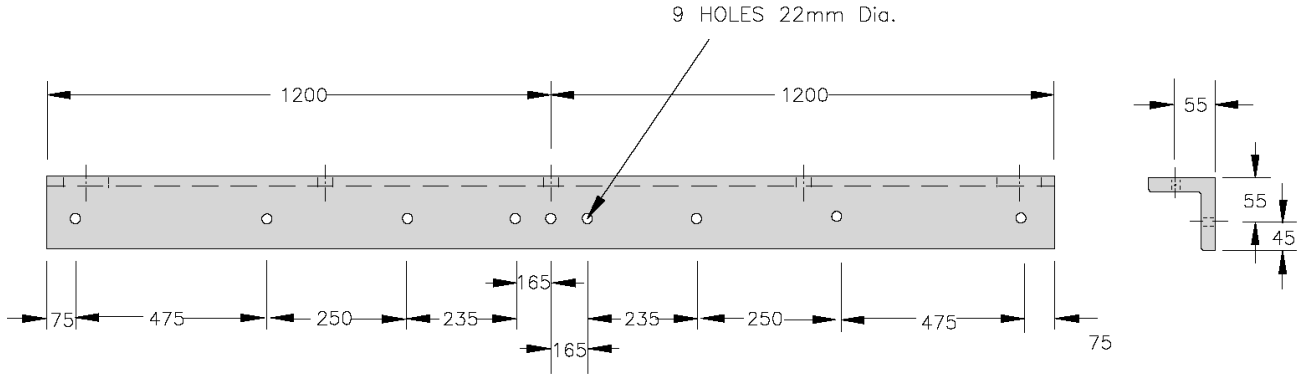
- List of Deviations and Clauses to which exception is taken by the Bidder/Vendor/Supplier. (Use separate sheet, if necessary).

Description	Manufacturer of Material/Equipment	Vendor/Supplier
Name of Company		
Location and Office Address		
Name and Signature of Authorized Representative with Date		
Official Seal / Stamp		

11. DRAWINGS



FRONT VIEW



TOP VIEW

FIG. 1: CROSSARM – L 100x100x12x2400 mm L.G. (908202080)

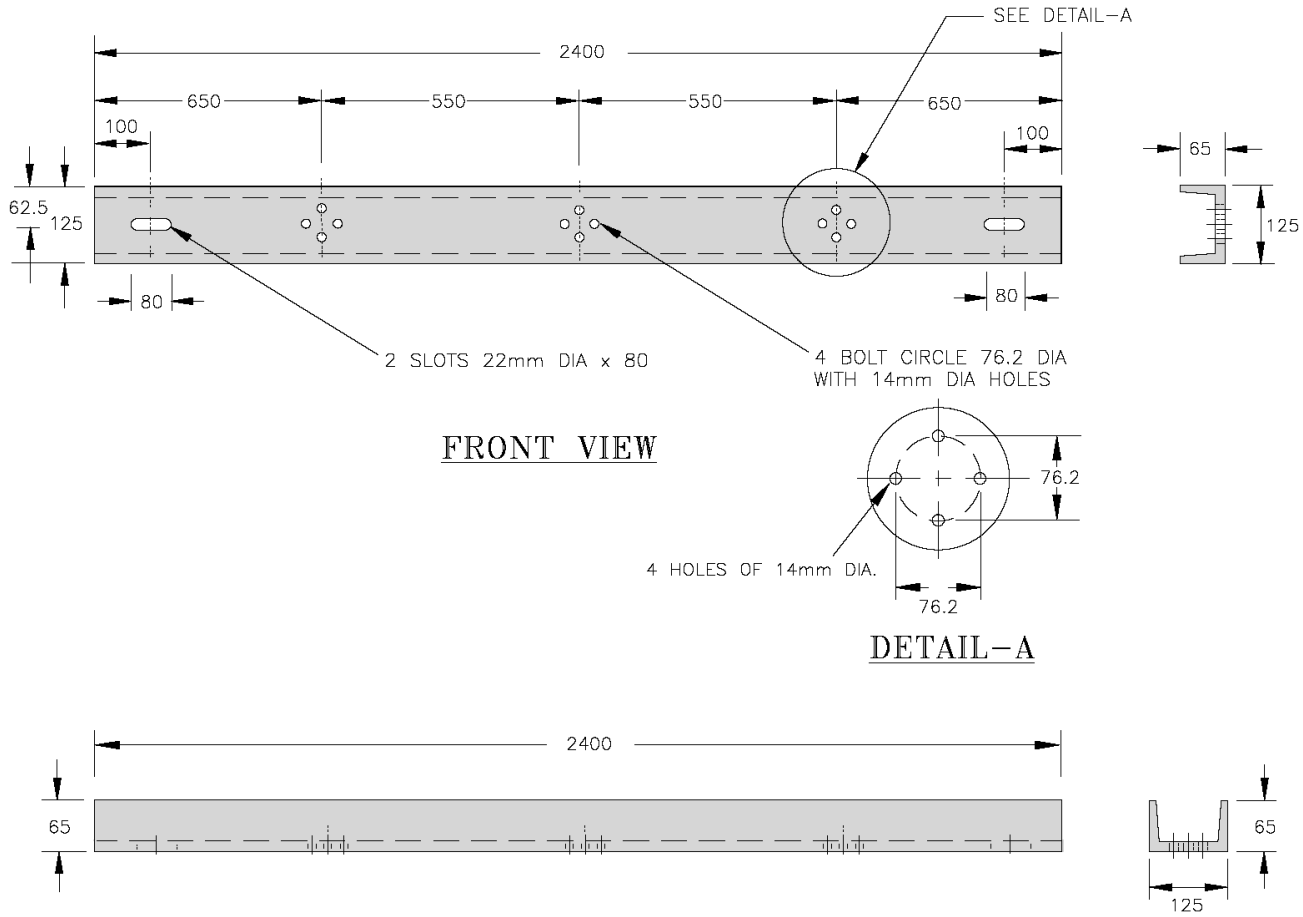


FIG. 2: FUSE CUTOUT MOUNTING CHANNEL FOR H-POLE PMT (908202081)

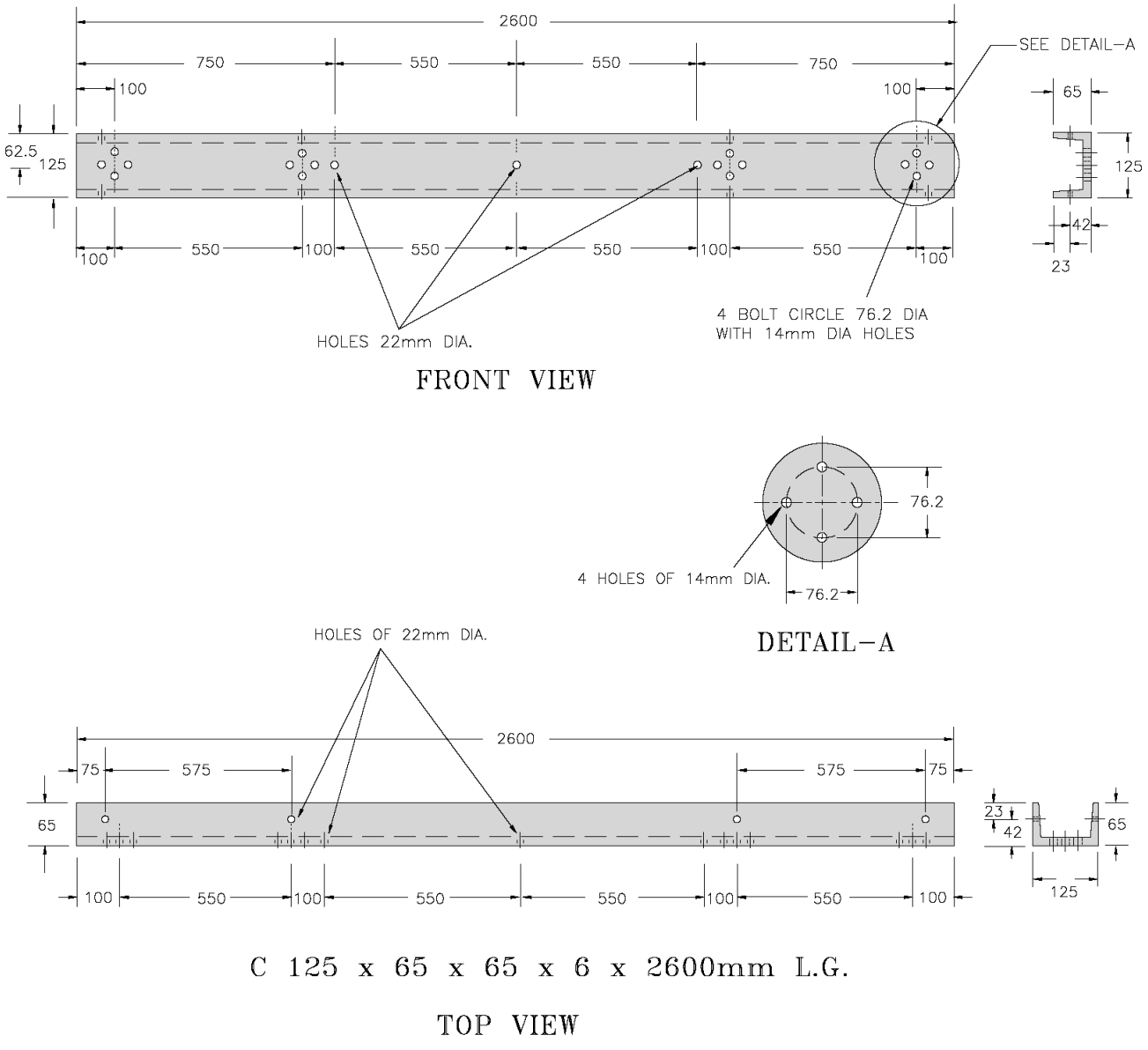
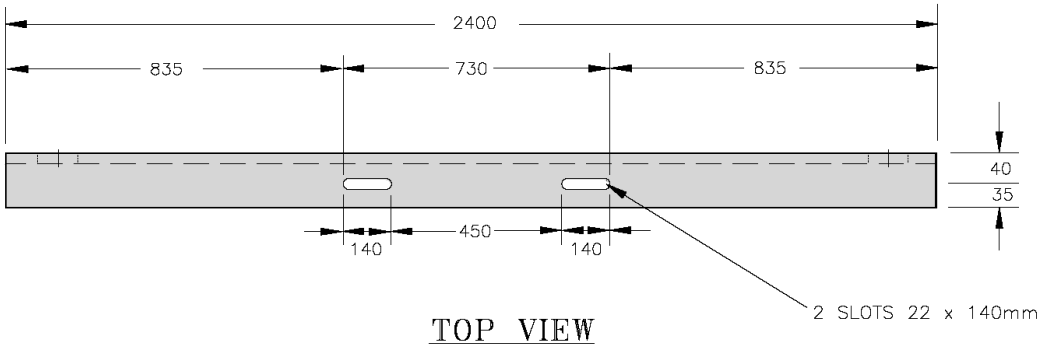
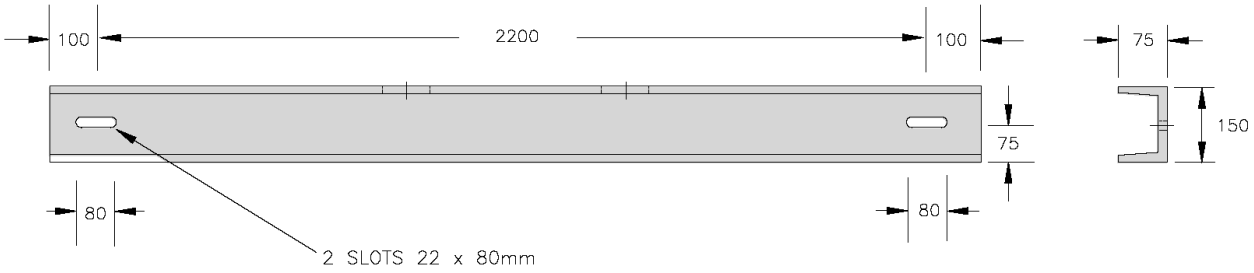


FIG. 2A: FUSE CUTOUT MOUNTING CHANNEL FOR SINGLE-POLE PMT (908202211)



TOP VIEW



150x75x75x6.5x2400mm

FRONT VIEW

FIG. 3: TRANSFORMER MOUNTING CHANNEL (908202082)

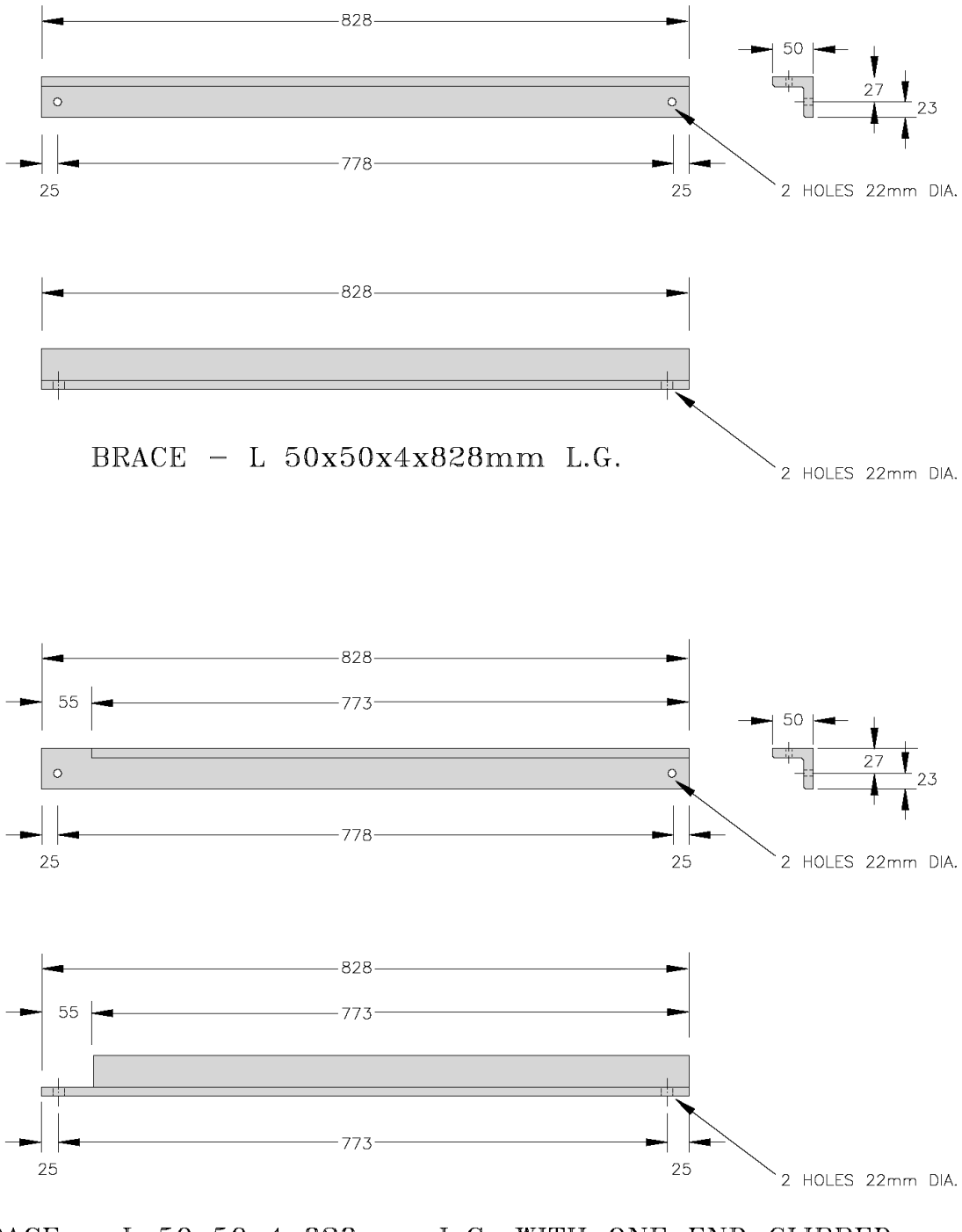
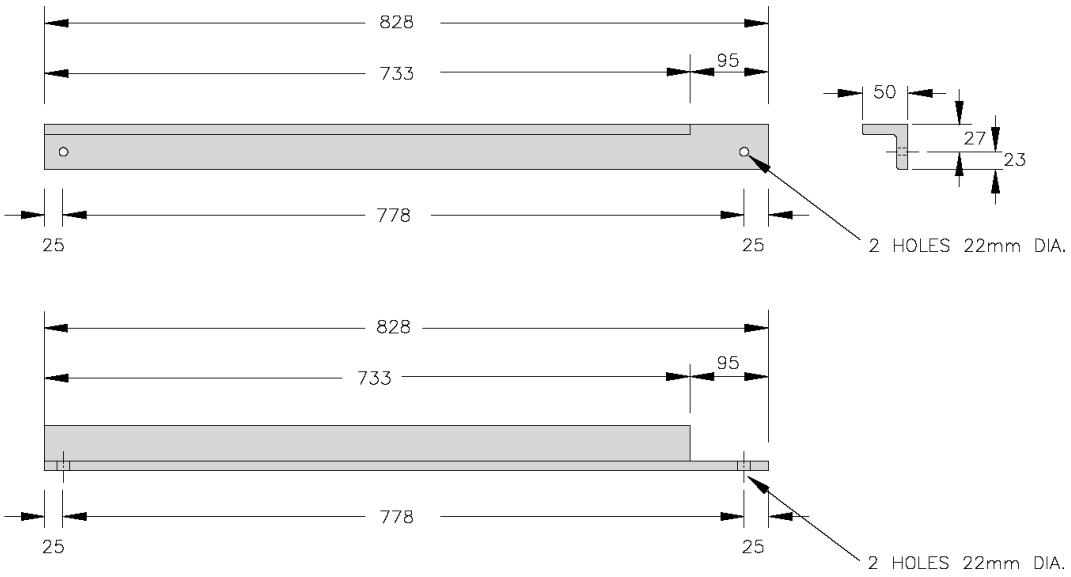
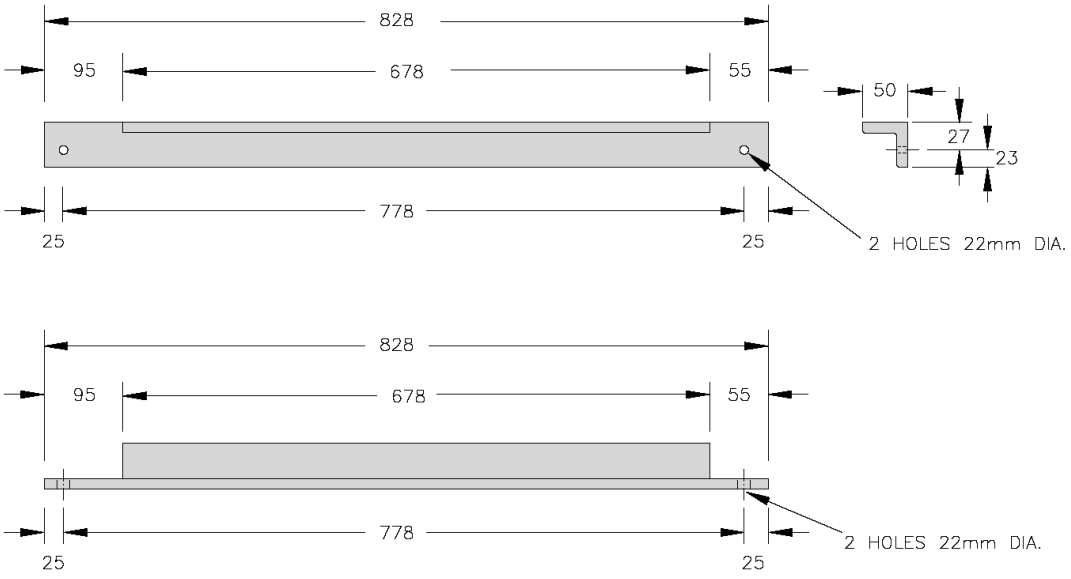


FIG. 4: BRACE-SET 2L 50x50x4x828 mm L.G. FOR MV POLES (908202083)



BRACE – L 50x50x4x828mm L.G. ONE END CLIPPED



BRACE – L 50x50x4x828mm L.G. BOTH ENDS CLIPPED

FIG. 4A: BRACE-SET 2L 50x50x4x828 mm L.G. FOR SINGLE POLE PMT (908202228)

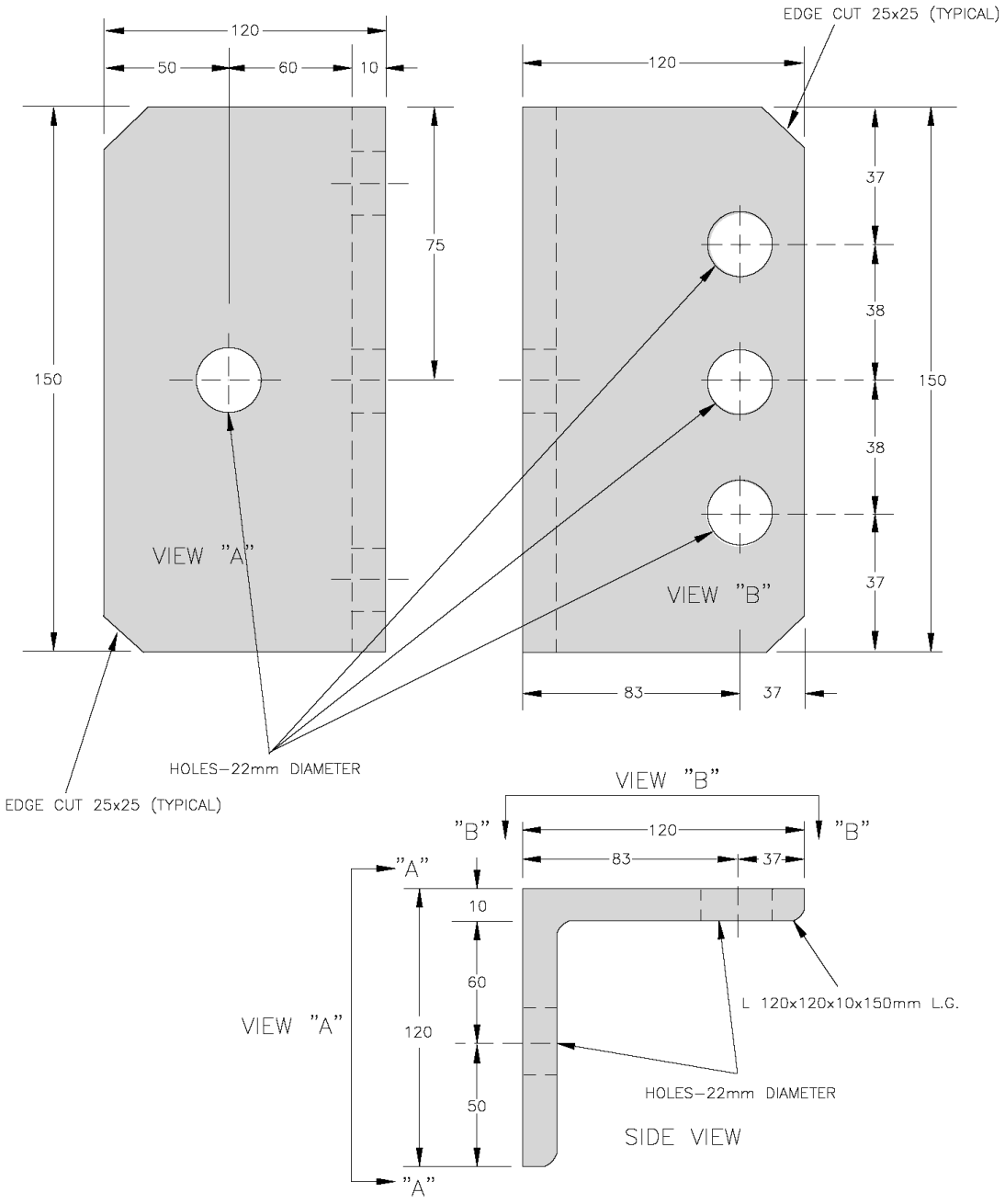
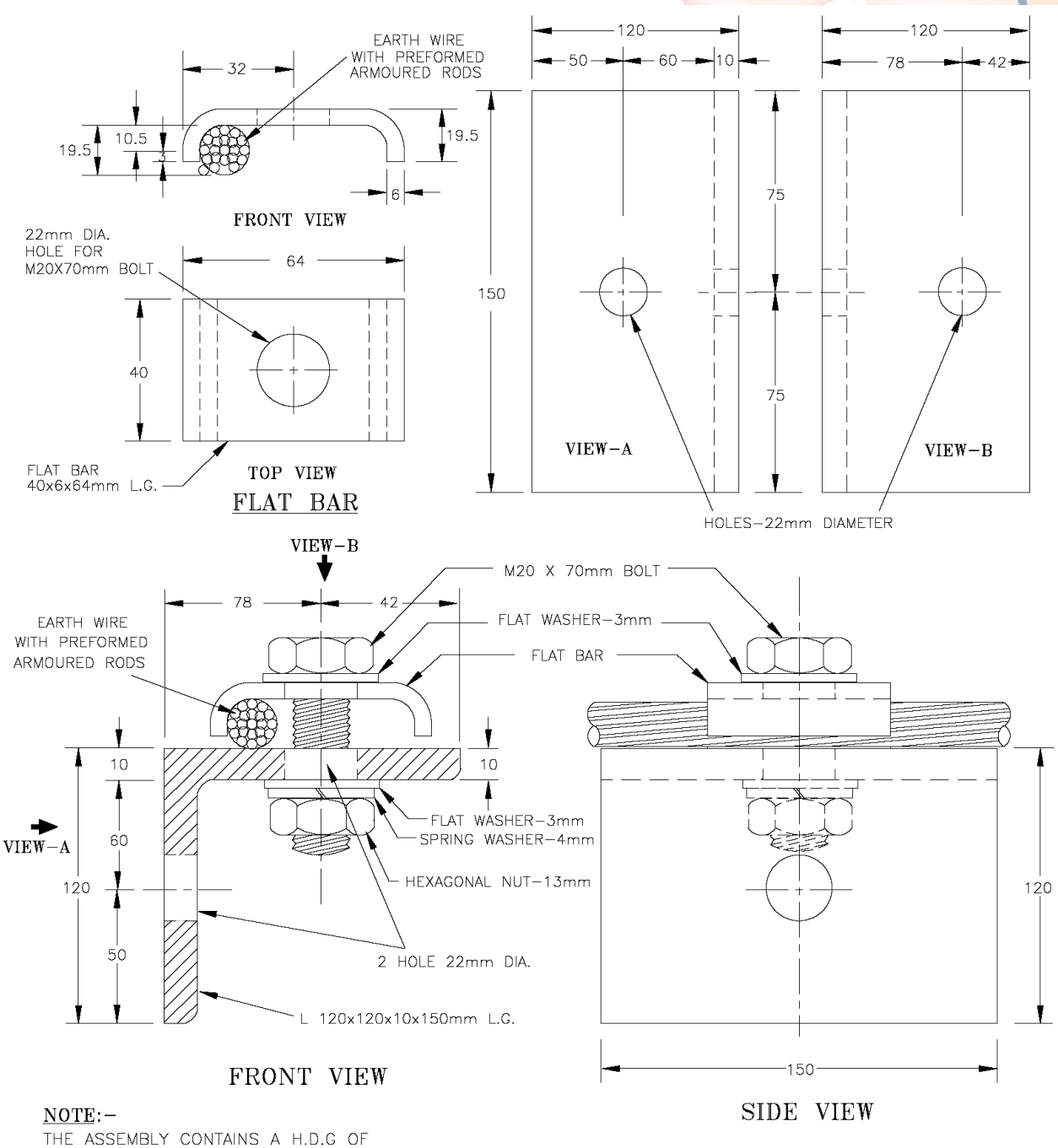


FIG. 5: EARTHWIRE SUSPENSION SUPPORT-L 120x120x10x150 mm L.G. (908202067)



NOTE:-
THE ASSEMBLY CONTAINS A H.D.G OF
- L 120x120x10x150mm L.G.
- FLAT BAR 40X64X6mm THK.
- MACHINE BOLT M20X70mm WITH 2-FLAT WASHERS, 1-SPRING WASHER & 1-HEXAGONAL NUT

FIG. 6: EARTHWIRE SUPPORT ASSEMBLY (908202044)

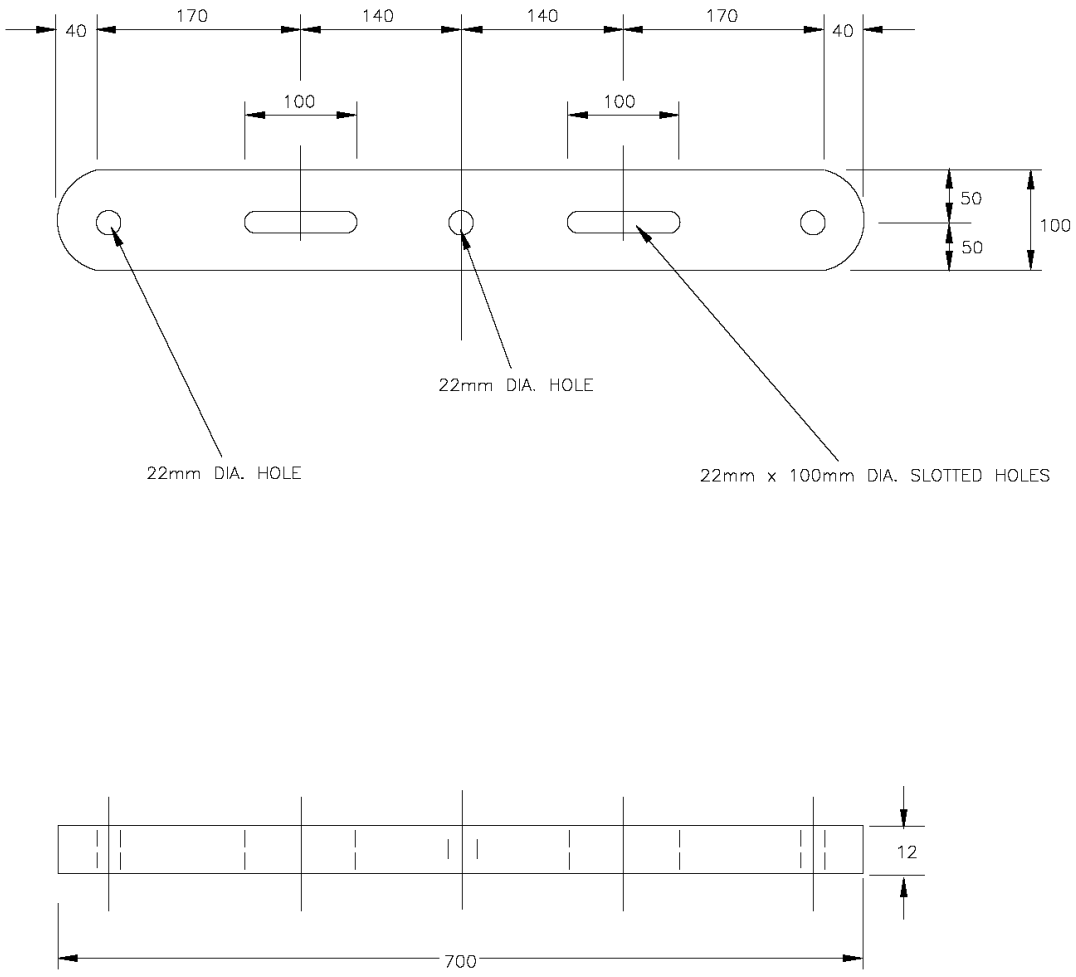
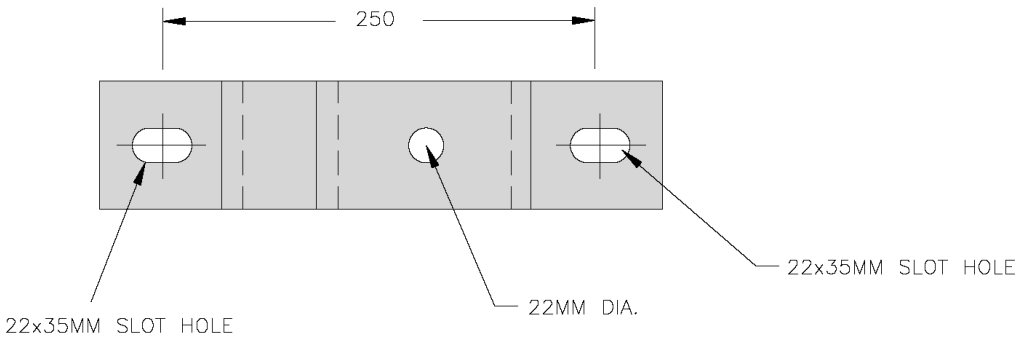


FIG. 7: DOUBLE ARMING PLATE-L 100x12x700 mm L.G. (908202042)



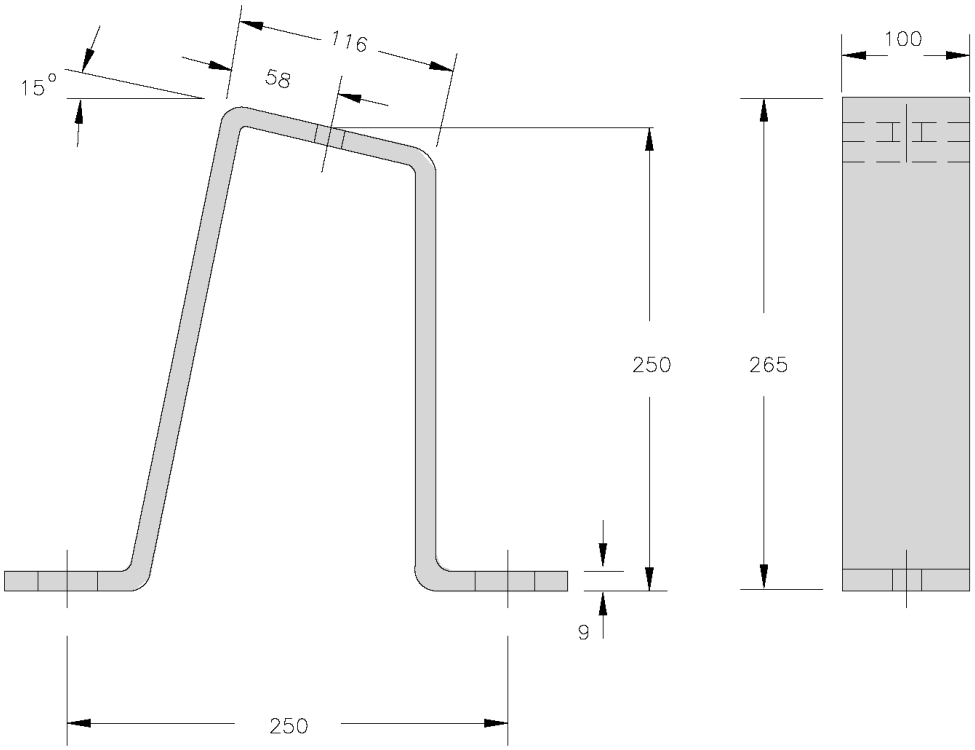


FIG. 8: HORIZONTAL INSULATOR MOUNTING BRACKET (908202084)

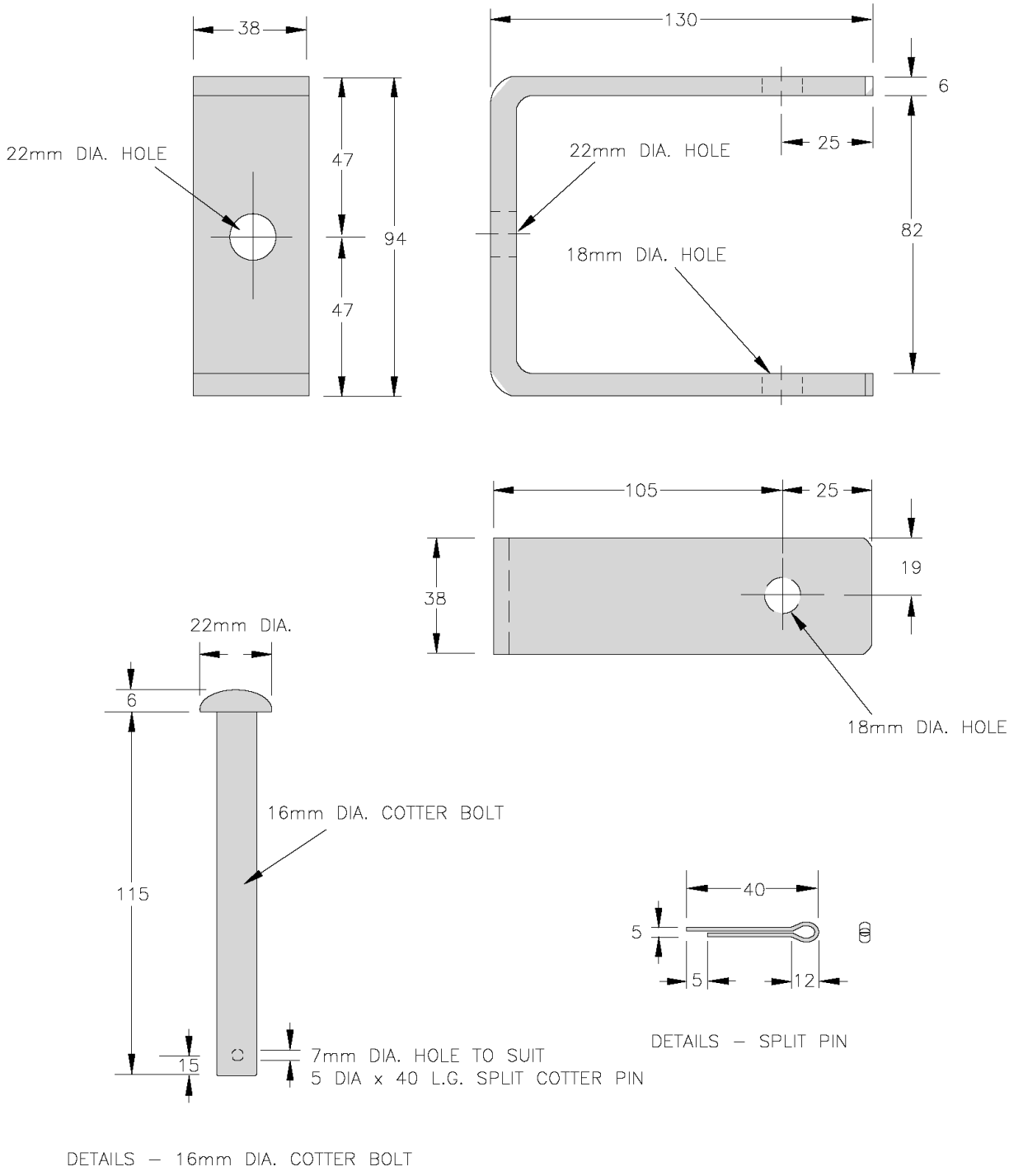
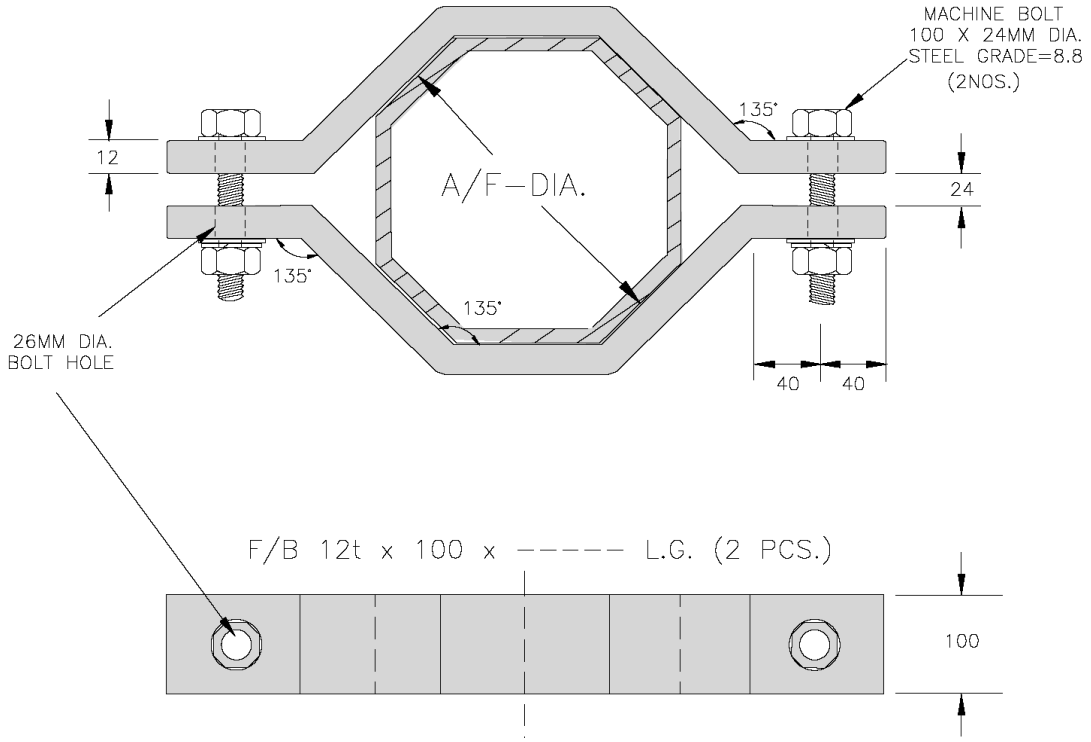


FIG. 9: SPOOL INSULATOR BRACKET (908202085)



106 (908202032) **166 (908202086)** **190 (908202213)**

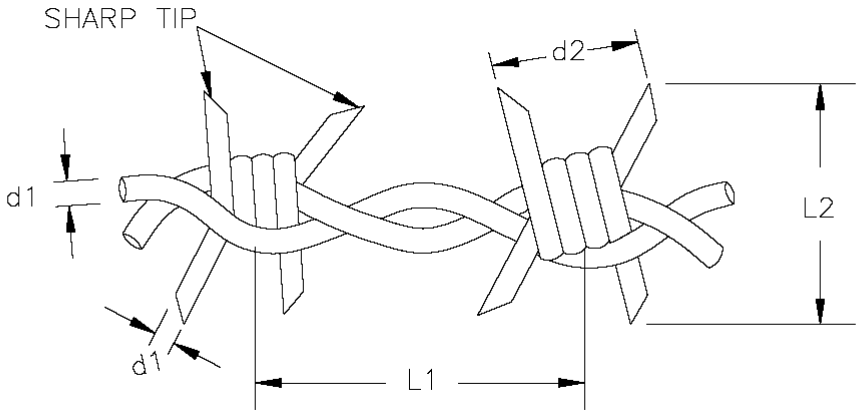
	OC POLE CODE	POLE BAND ACROSS FLAT (A/F)
L.V	OC10	106
S/C	OC12S, OC13S, OC14S & OC15S/D	166, 190, 210 & 234
D/C	OC14D	166, 190, 210 & 242
P.M.T H-STRUC.	OC12S, OC13S & OC14S	190, 210 & 234
P.M.T S-STRUC.	OC12S, OC13S & OC14S	190, 210 & 234

210 (908202088) **234 (908202214)** **242 (908202087)**

NOTE:-

- EACH POLE BAND (STAY CLAMP) SHALL BE PROVIDED WITH 2NOS. MACHINE BOLTS M24X100.

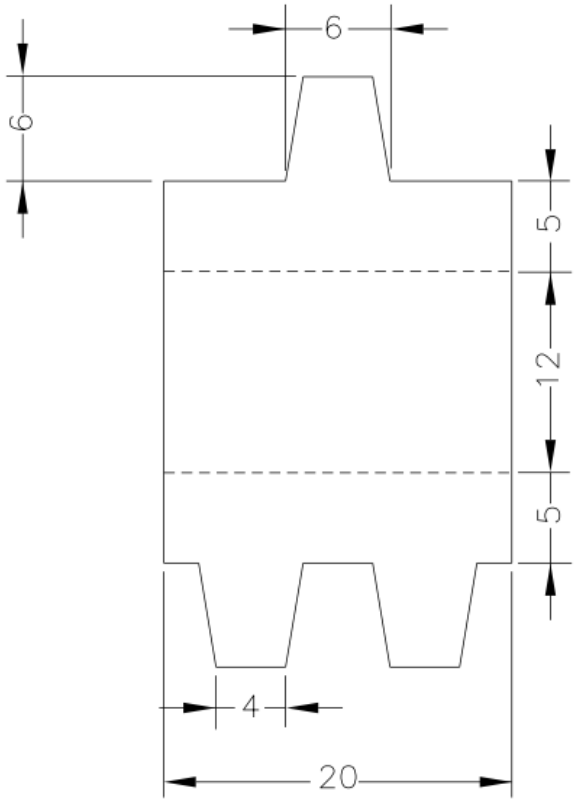
FIG. 10: POLE BAND (STAY CLAMP) FOR OCTAGONAL STEEL POLE

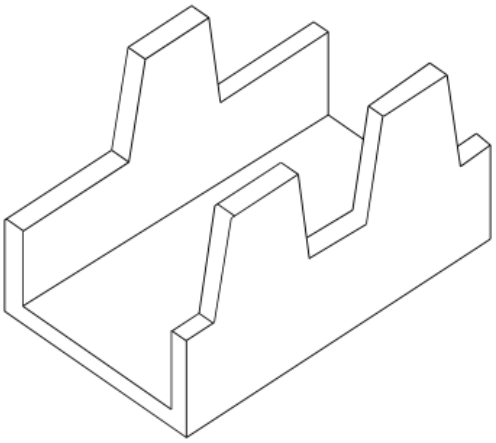


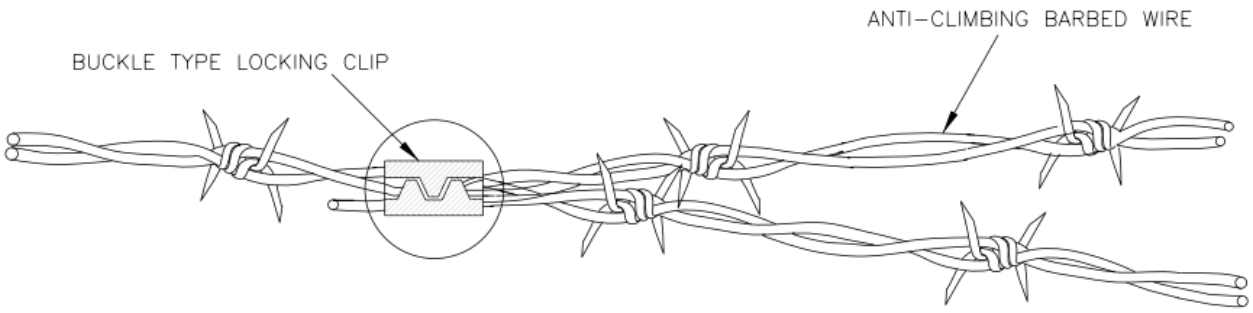
WIRE DIA. (MIN.)		BARBS SPACING (MAX.)	BARBS SIZE	BARBS TYPE	MIN. BREAKING STRENGTH
d1	d2	L1	L2	DOUBLE TWISTED	4.23 kN
2.5	9.5	85	30-50		

NOTE: MATERIAL – GALVANIZED CARBON STEEL

FIG. 13: ANTI-CLIMBING BARBED WIRE (908202089)





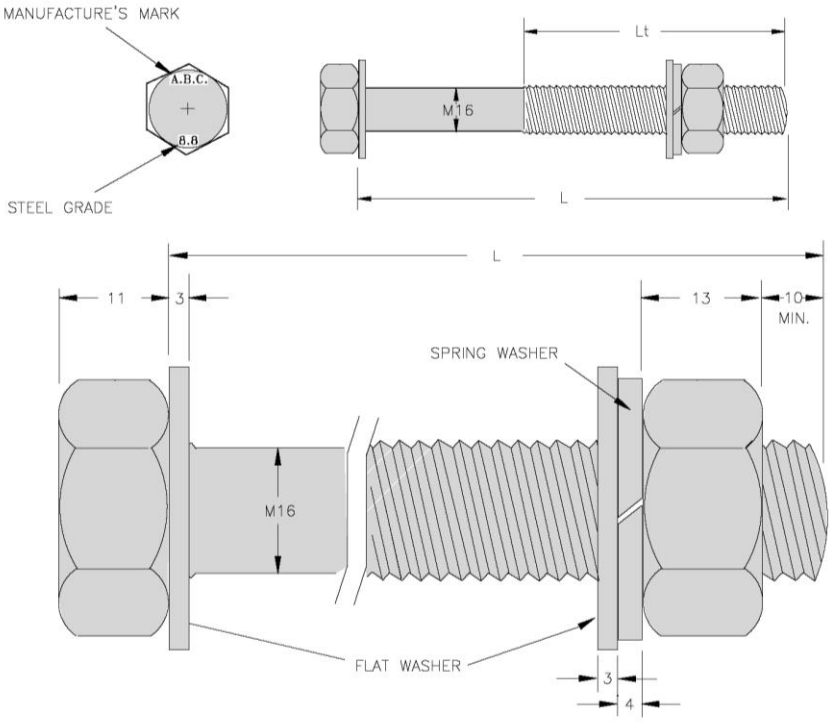


Note: MATERIAL – STAINLESS STEEL
THICKNESS – 1.0 mm

FIG. 13A: BUCKLE LOCKING CLIP FOR BARBED WIRE (908202090)

Ø – DIAMETER OF BOLT
L – LENGTH OF BOLT
Lt – LENGTH OF THREADS

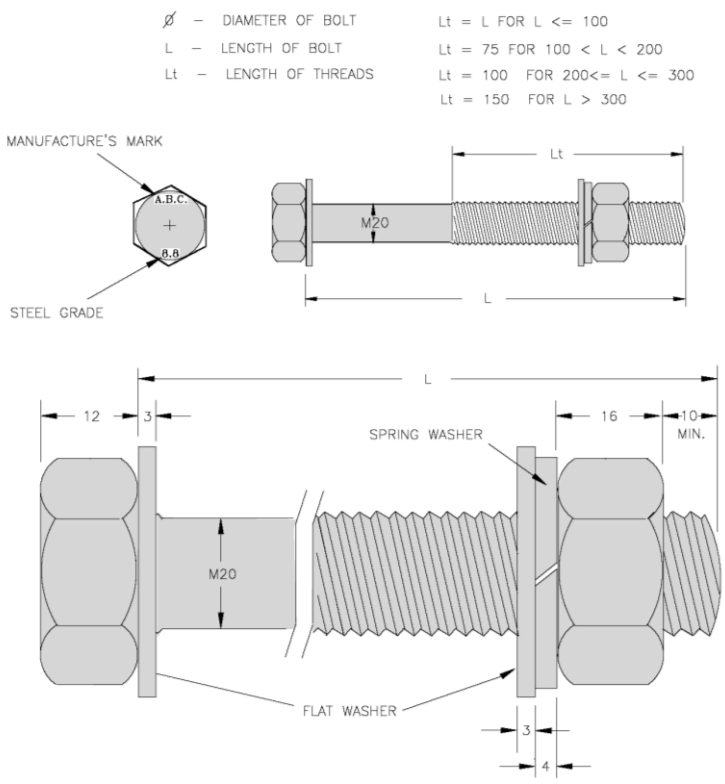
Lt = L FOR L <= 100
Lt = 75 FOR 100 < L < 200
Lt = 100 FOR 200 <= L <=300
Lt = 150 FOR L > 300



MACHINE BOLT-M16 LENGTH	SEC ITEM CODE
145	908202009
165	908202217
275	908202010
300	908202218

NOTE:–
– EACH BOLT SHOULD BE PROVIDED WITH 1 NUT, 2FLAT WASHERS AND 1 SPRING WASHER OF ABOVE MENTIONTED SIZE.
– ALL BOLTS SHALL BE GRADED 8.8

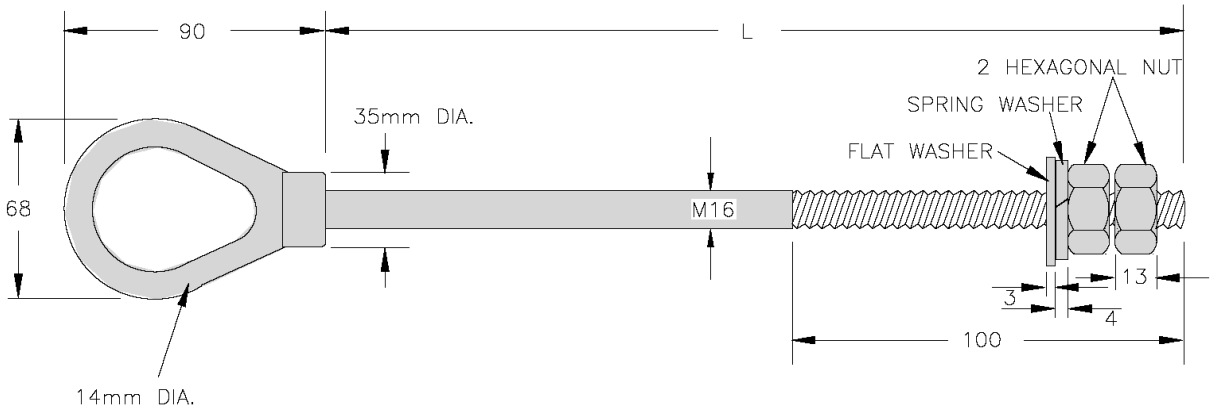
FIG. 14: MACHINE BOLT – M16



MACHINE BOLT, M20 LENGTH	SEC ITEM CODE
60	908202012
225	908202014
265	908202015
285	908202219
310	908202019
325	908202020
365	908202023
380	908202024
400	908202025

NOTE:–
- EACH BOLT SHOULD BE PROVIDED WITH 1 NUT, 2FLAT WASHERS AND 1 SPRING WASHER OF ABOVE MENTIONTED SIZE.
- ALL BOLTS SHALL BE GRADED 8.8

FIG. 15: MACHINE BOLT – M20

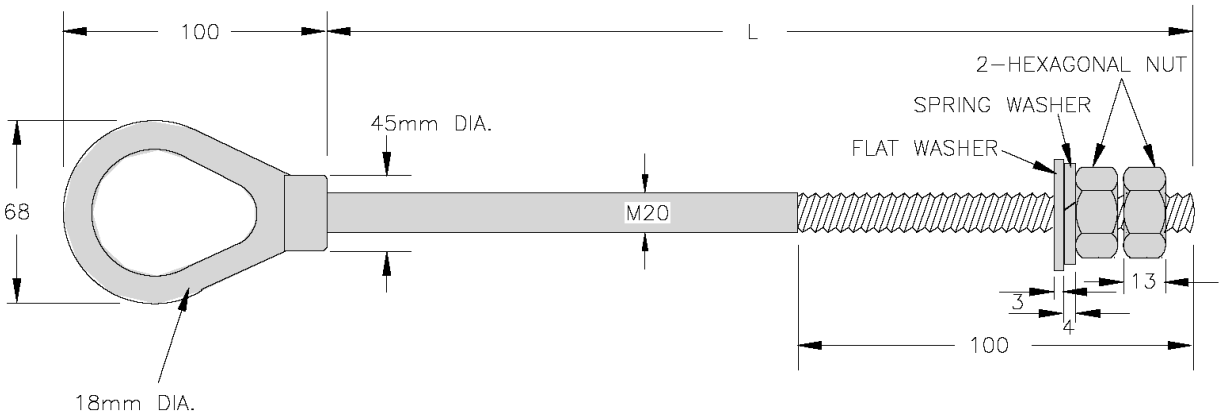


SHOULDER EYEBOLT, M16 LENGTH	SEC ITEM CODE
155	908202220
170	908202003
180	908202198
235	908202221
255	908202222
265	908202005
275	908202223
285	908202224
300	908202006
310	908202225

NOTE:–

- EACH SHOULDER EYEBOLT SHOULD BE PROVIDED WITH 2 NUTS, 1 FLAT WASHER AND 1 SPRING WASHER.
- ALL BOLTS SHALL BE GRADE 8.8
- SHOULDER EYEBOLT SHALL BE FORGED IN ONE PIECE WITHOUT WELDING

FIG. 16: SHOULDER EYEBOLT – M16

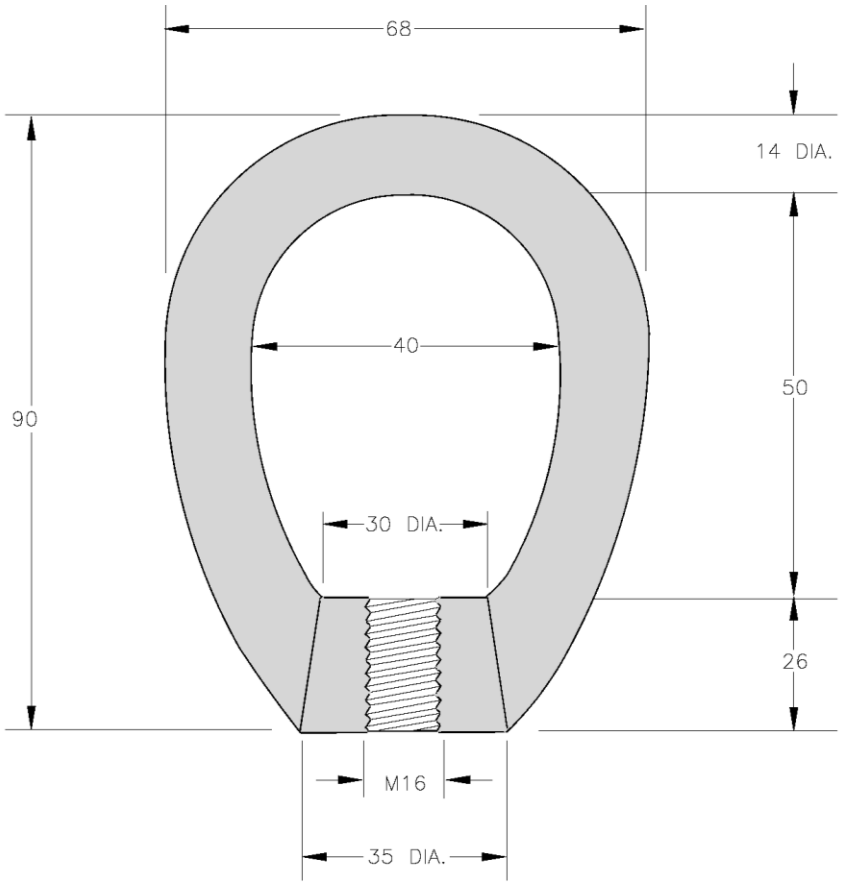


SHOULDER EYEBOLT, M20 LENGTH	SEC ITEM CODE
260	908202226
365	908202227

NOTE:–

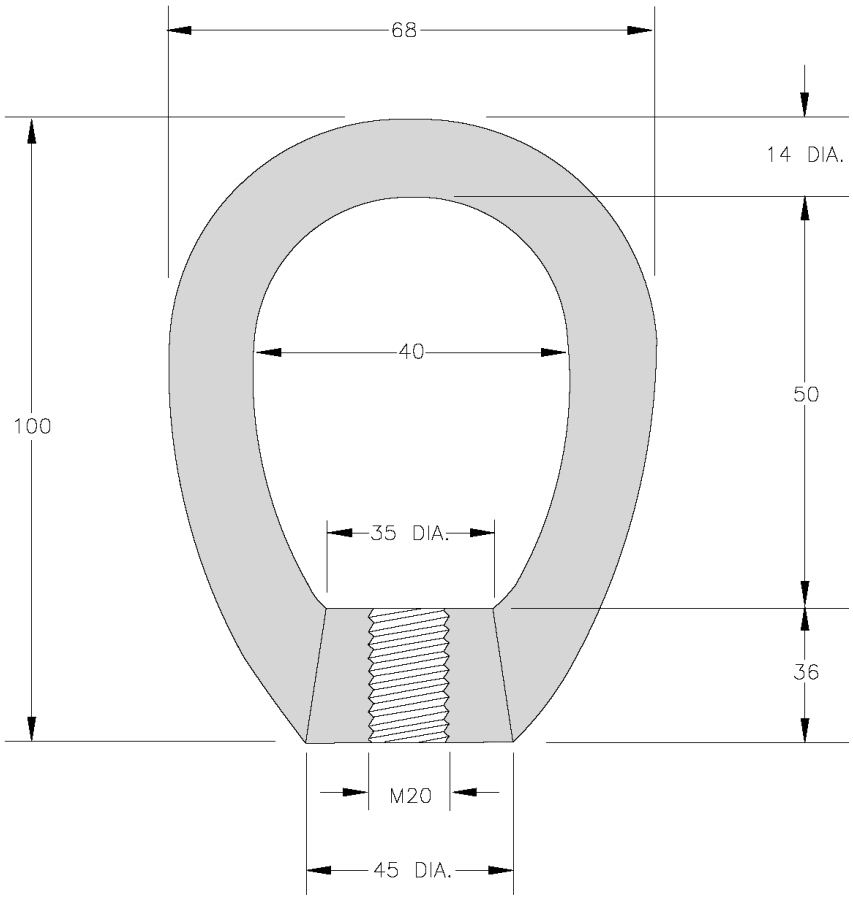
- EACH SHOULDER EYEBOLT SHOULD BE PROVIDED WITH 2 NUTS, 1 FLAT WASHER AND 1 SPRING WASHER.
- ALL BOLTS SHALL BE GRADE 8.8
- SHOULDER EYEBOLT SHALL BE FORGED IN ONE PIECE WITHOUT WELDING

FIG. 17: SHOULDER EYEBOLT – M20



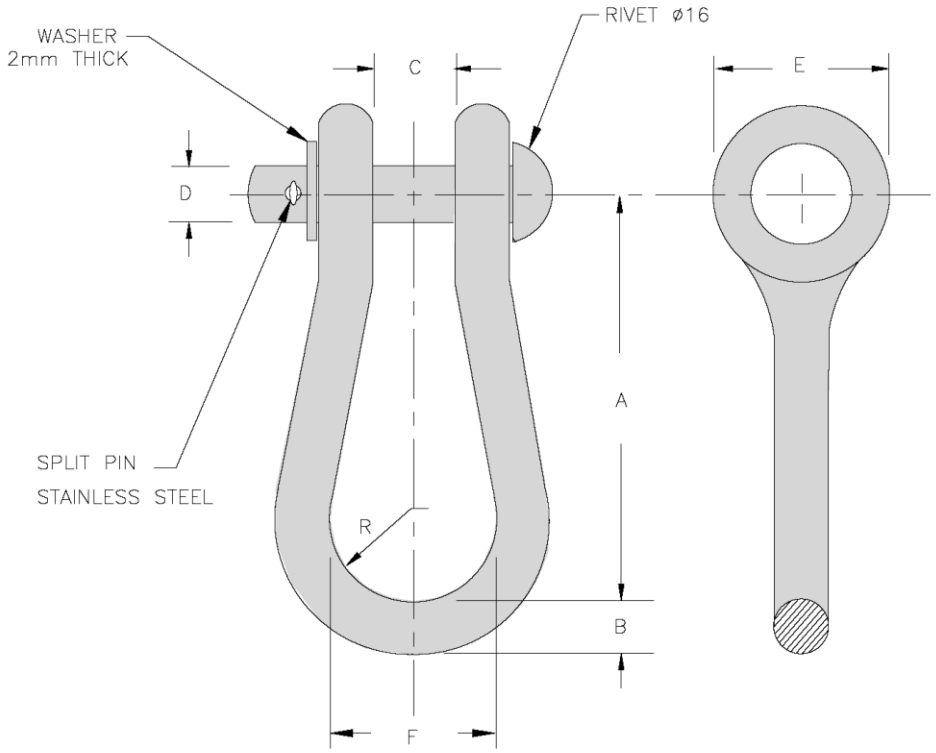
NOTE:–
MATERIAL – FORGED STEEL, H.D.G.
EYE NUT – UTS = 6,500 Kg.

FIG. 18: EYE NUT FOR M16 (908202036)



NOTE:–
MATERIAL – FORGED STEEL, H.D.G.
EYE NUT – UTS = 6,500 Kg.

FIG. 19: EYE NUT FOR M20 (908202037)



	DIMENSIONS							U.T.S. (KN)
	A	B	C	D	E	F	R	MIN.
SHACKLE	90	16	22	16	38	38	19	45KN

MATERIAL – FORGED STEEL
FINISH – HOT DIP GALVANISED

FIG. 20: ANCHOR SHACKLE (908202055)

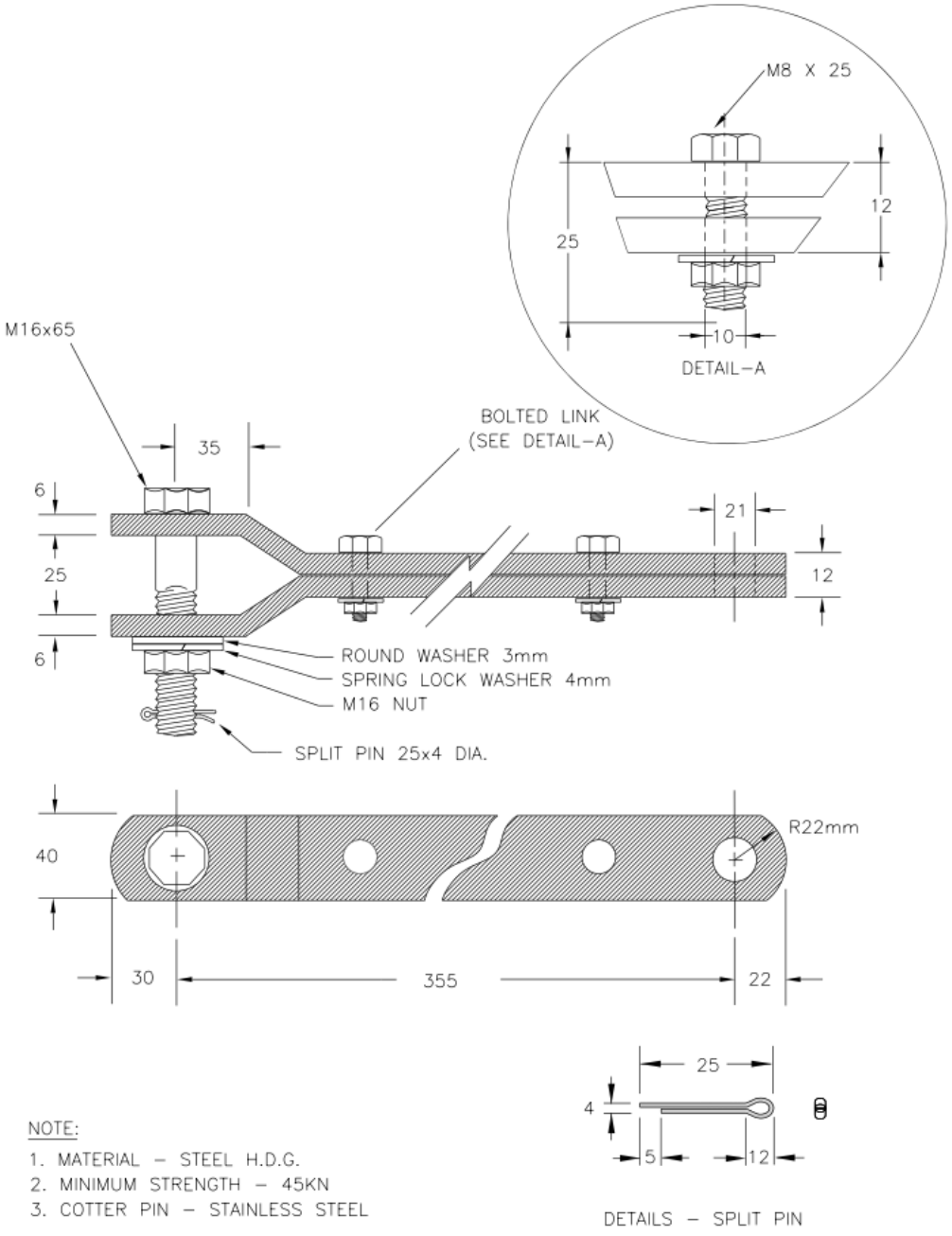
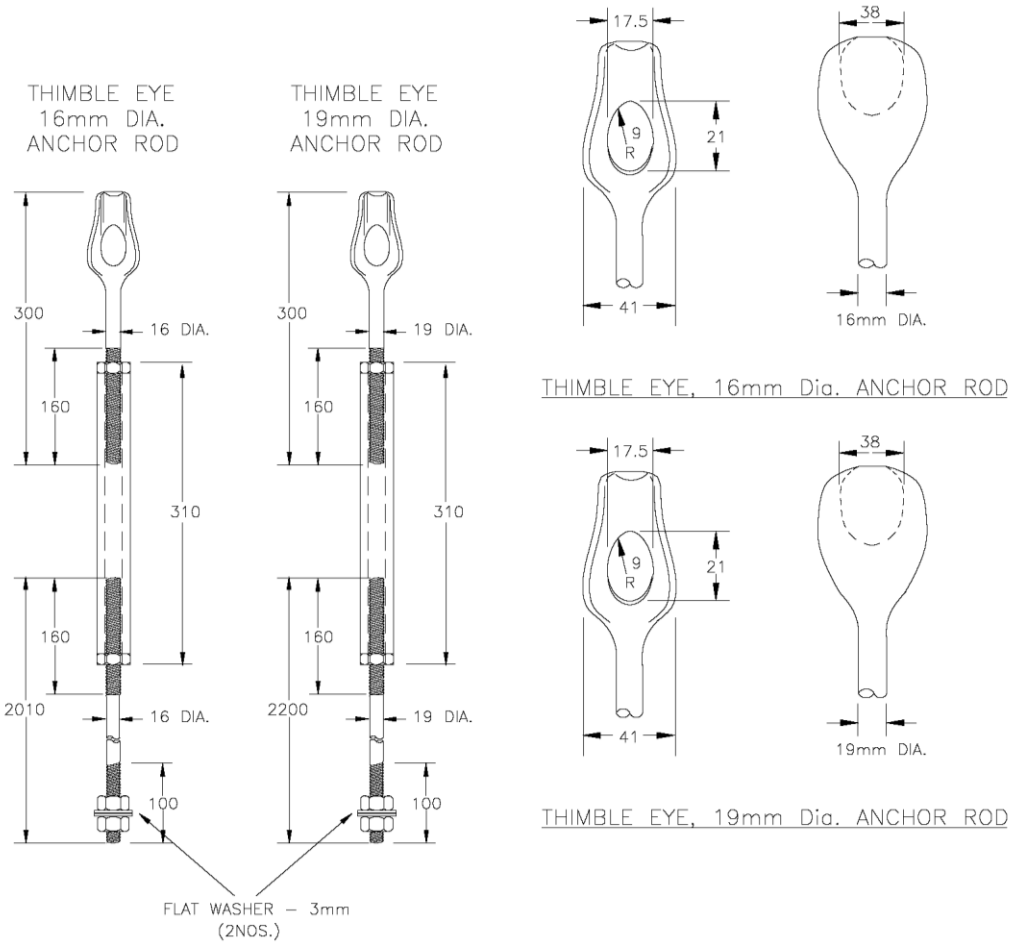


FIG. 21: CLEVIS EYE EXTENSION (908202186)

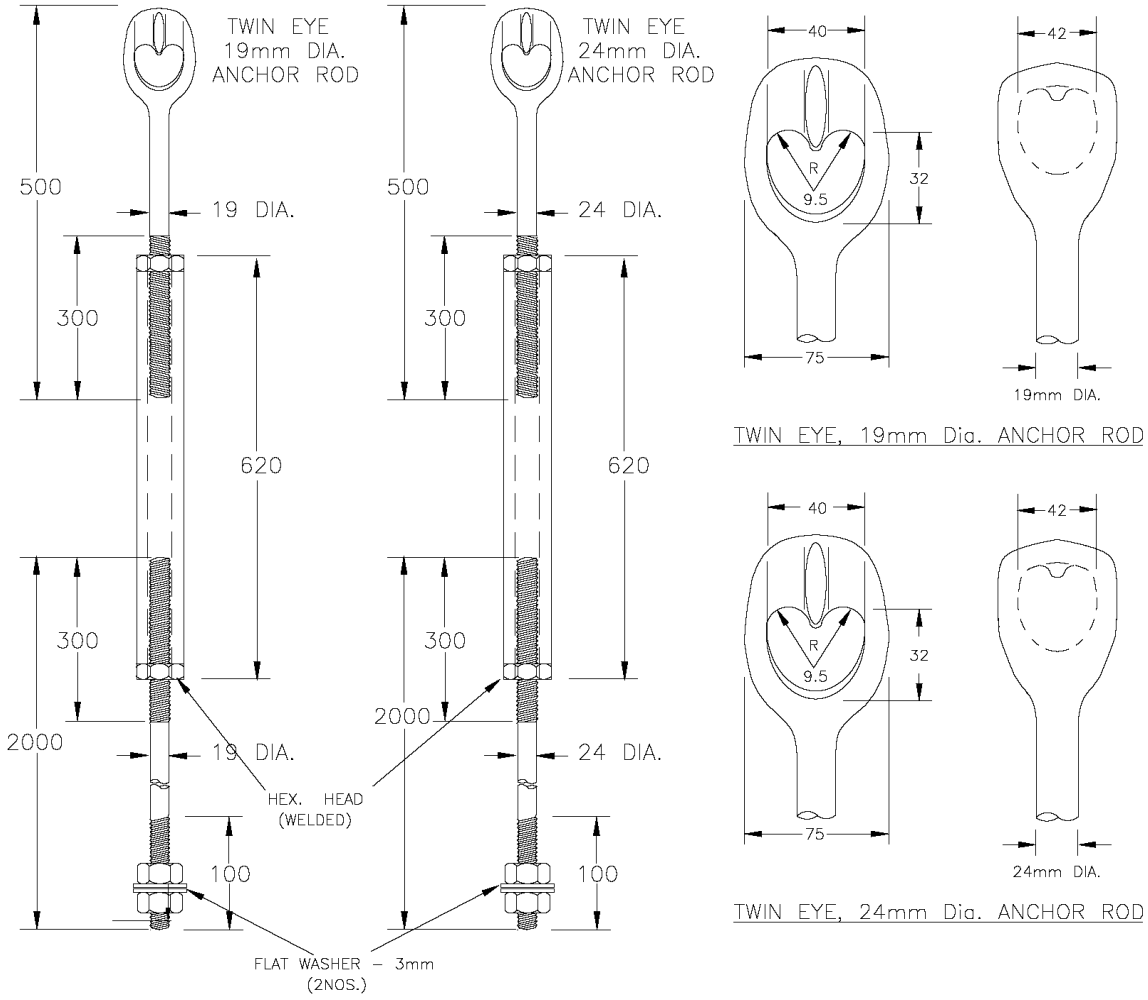


ANCHOR ROD DIAMETER	ANCHOR ROD LENGTH	UTS MIN.	THIMBLE EYE TYPE	SEC ITEM CODE
16	2500	65 KN	THIMBLE EYE	908202206
19	2500	101 KN	THIMBLE EYE	908202215

NOTE:–
MATERIAL – STEEL – HOT DIP GALVANIZED
TOLERANCE UP TO AND INCLUDING 35mm ±0.7mm AND OVER 35mm ±2%

FIG. 22: ANCHOR ROD THIMBLE EYE WITH TURN BUCKLE (ADJUSTABLE)

16 & 19 mm DIAMETER

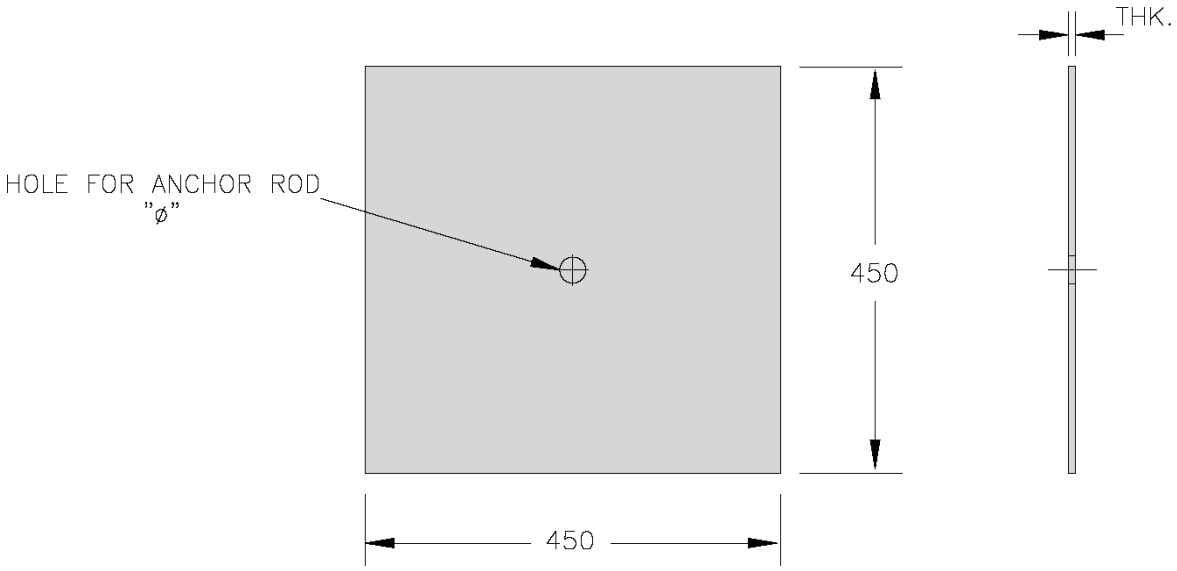


ANCHOR ROD DIAMETER	ANCHOR ROD LENGTH	UTS MIN.	THIMBLE EYE TYPE	SEC ITEM CODE
19	2500	101 KN	TWIN EYE	908202216
24	2500	130 KN	TWIN EYE	908202203

NOTE:–
MATERIAL – STEEL – HOT DIP GALVANIZED

FIG. 22A: ANCHOR ROD TWIN EYE WITH TURN BUCKLE (ADJUSTABLE)

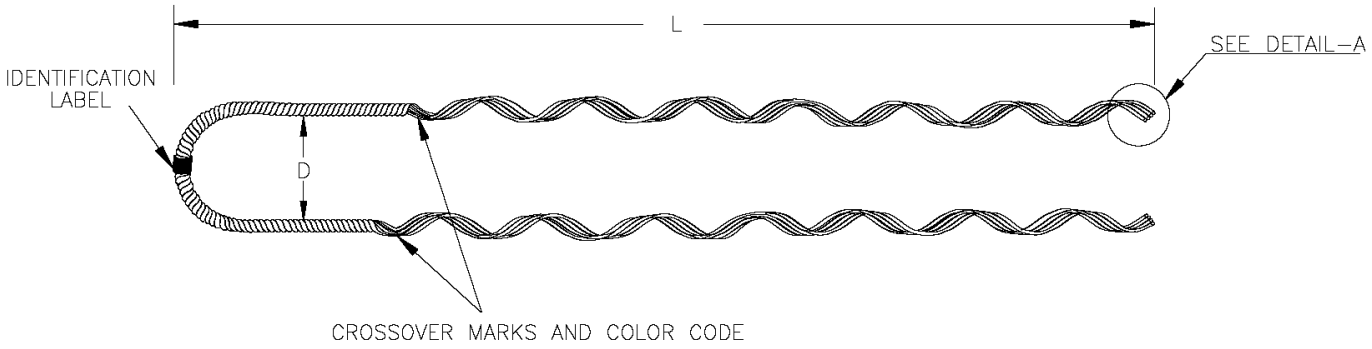
19 & 24 mm DIAMETER



STAY PLATE DIMENSION	STAY PLATE HOLE DIAMETER (Ø)	SEC ITEM CODE
450 x 450 x 6 THK	18	908202205
450 x 450 x 10 THK	22	908202207
450 x 450 x 10 THK	26	908202204

FIG. 23: STEEL PLATE H.D.G. FOR ANCHOR RODS

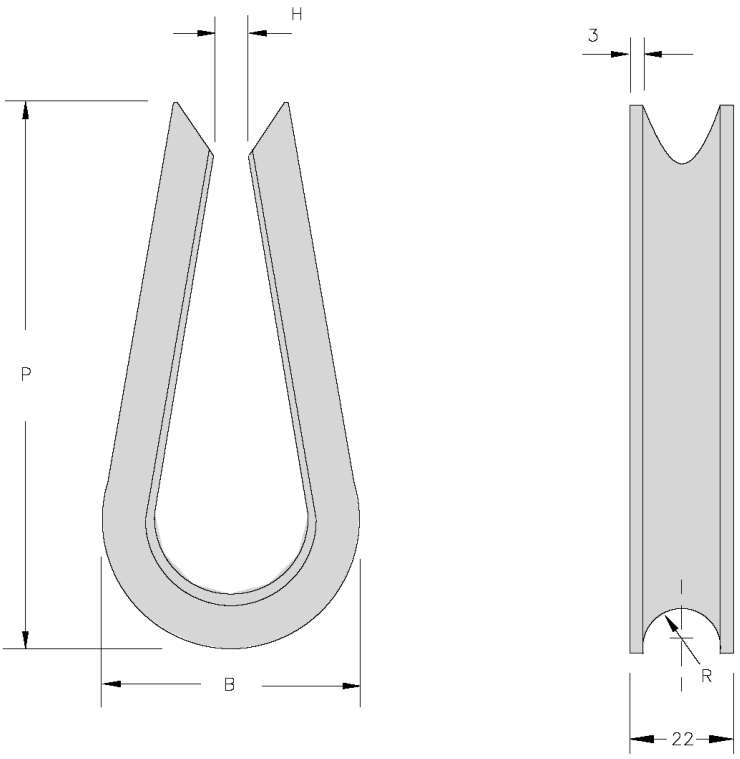
DETAIL–A



FOR STAY WIRE	DIA. RANGE (MIN.-MAX)	APPROX. LENGTH (L) ±30mm	NUMBER OF STRANDS	STRAND DIA. (d)	MINIMUM BREAKING LOAD	COLOR I.D. CODE	SEC ITEM CODE
7/4, 12 mm DIA	11.7-12.10	940	5	3.51	101 kN	RED	908202188
7/3.25, 9.8mm DIA	9.7-10.07	840	5	3.02	65 kN	YELLOW	908202202

NOTE:–
– MATERIAL: GALVANIZED CARBON STEEEL WIRE,

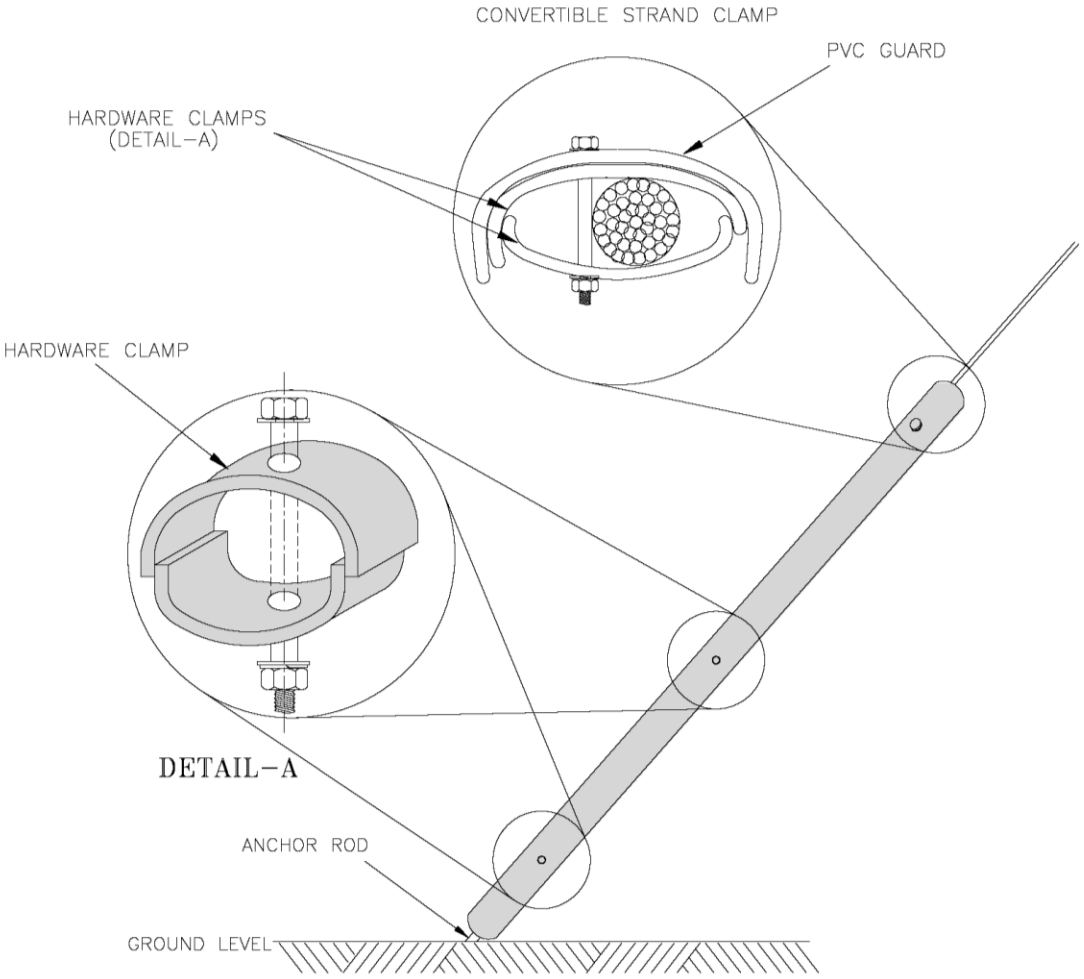
FIG. 26: PREFORMED GUY GRIP (DEAD END GRIP)



OVER–ALL RANGE STAY WIRE DIMENSION	DIMENSIONS				THICKNESS
	P	H	R	B	
9.6 – 12.2mm	80	26	8	50	3

NOTE
– MATERIAL : HOT DIP GALVANIZED STEEL

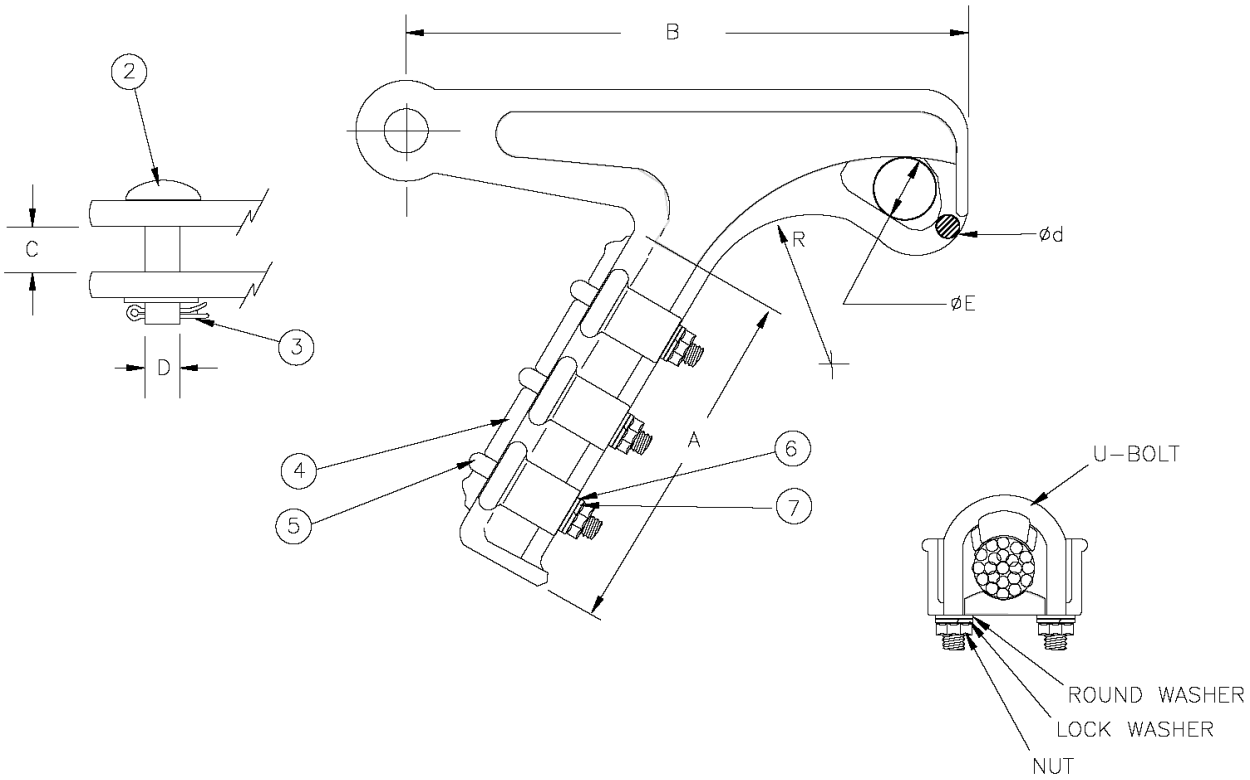
FIG. 27: GUY THIMBLE (908202069)



GUY WIRE	DIAMETER (MIN)	DIMENSIONS		COLOR
		LENGTH	WIDTH	
GUY WIRE, 7 STRANDS GALVANIZED STEEL	12mm	2440mm	51mm	YELLOW
	9.8mm	2440mm	51mm	YELLOW

COLOR : HIGH VISIBILITY BRIGHT YELLOW

FIG. 28: GUY WIRE GUARD, YELLOW COLOR, 2.44 METERS (908202193)



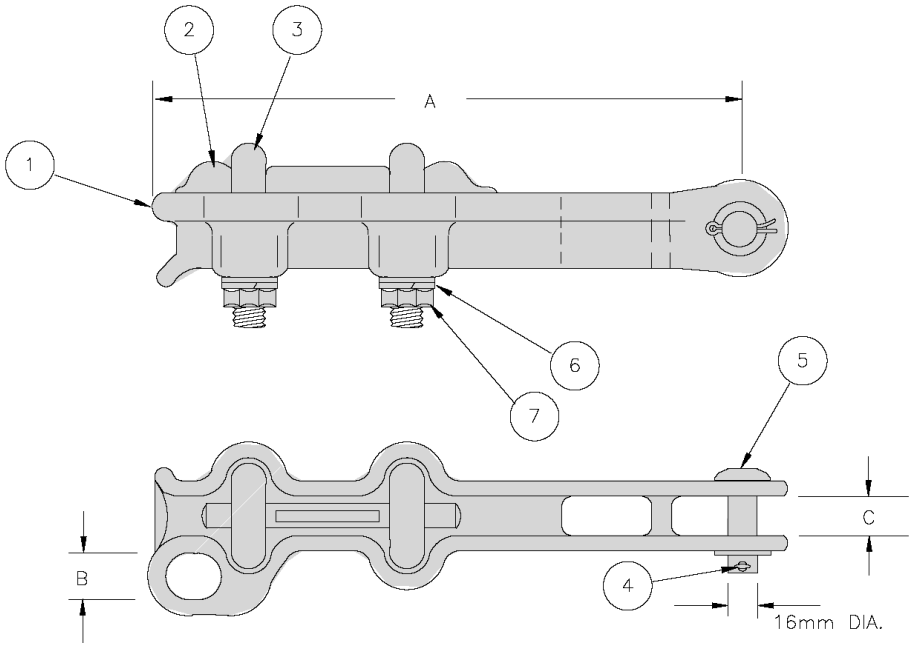
N O T E :

1. ALUMINUM ALLOY – BODY
2. STEEL – BOLTS PIN
3. STAINLESS STEEL – COTTER PIN
4. ALUMINUM ALLOY – LINE GUARDS
5. STEEL – U–BOLTS
6. STEEL – LOCK WASHERS
7. STEEL – ROUND WASHERS

CONDUCTORS NAME	DIA.	CLAMP DIMENSIONS							U-BOLT		UTS (kN) MIN.	SEC ITEM CODE
		A	B	C	D	E	d	R	No.	SIZE		
QUAIL	11.34	187	203	19	16	24	13	95	3	14	36	908202091
MERLIN	17.35	187	292	25.4	16	26	15	137	3	14	45	908202092

– HOT DIP GALVANIZED (STEEL PART ONLY)

FIG. 29: STRAIN CLAMPS, 3 U-BOLTS TYPE



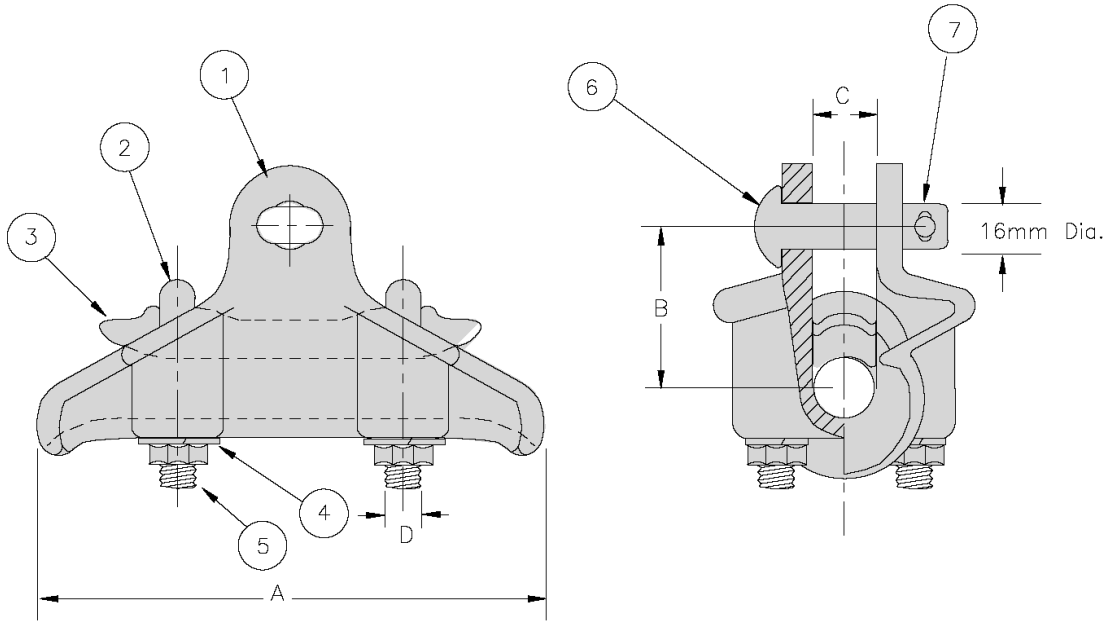
NOTE:

1. ALUMINUM ALLOY – BODY
2. ALUMINUM ALLOY – LINE GUARD
3. STEEL – U–BOLTS
4. STAINLESS STEEL – COTTER PIN
5. STEEL – BOLT PIN
6. STEEL – ROUND & LOCK WASHERS
7. STAINLESS – NUTS

CONDUCTOR	DIAMETER	U-BOLT		CLAMP DIMENSION			UTS (kN) MIN.	SEC ITEM CODE
		NO.	SIZE	A	B	C		
QUAIL	11.34	2	12	210	25	19	36	908202093
QUAD-MESSENGER	14.31	2	12	210	25	19	45	908202094

– HOT DIP GALVANIZED (STEEL PART ONLY)

FIG. 30: STRAIN CLAMP, STRAIGHT LINE DEAD-END (2 U-BOLT TYPE)

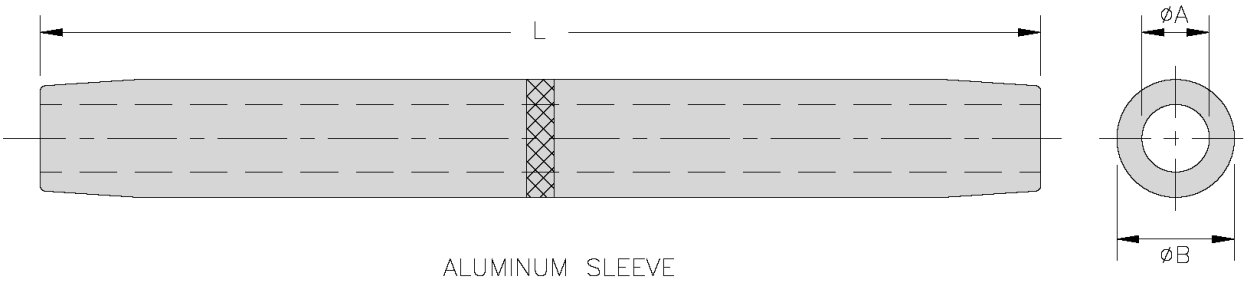


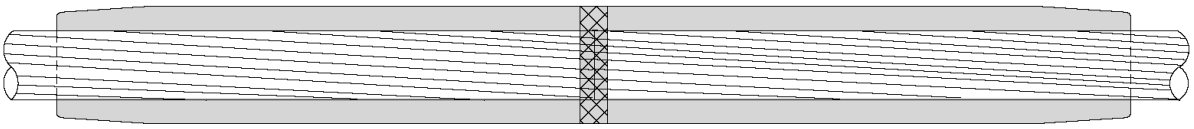
N O T E :

1. ALUMINUM ALLOY – BODY
2. STEEL – U–BOLTS
3. ALUMINUM ALLOY – LINE CLAMP SUPPORT
4. STEEL – ROUND/LOCK WASHERS
5. STEEL – NUTS
6. STEEL – BOLT PIN
7. STAINLESS STEEL – COTTER PIN
8. HOT DIP GALVANIZED
9. CLAMP DIMENSIONS TOLERANCE ± MAY ACCEPTABLE TO FIT THE PROPOSE CONDUCTOR SIZE

CONDUCTOR	DIAMETER	CLAMP DIMENSIONS				UTS (kN) MIN.	SEC ITEM CODE
		A	B	C	D		
QUAIL	11.34	146	55	19	12	36	908202096
MERLIN	17.35	190	65	24	12	45	908202097
QUADRUPLEX 120 mm² MESSENGER	14.31	190	65	24	12	45	908202201

FIG. 31: SUSPENSION CLAMP





CONDUCTOR DETAILS		ØA	ØB	LENGTH MIN.	UTS (kN) MIN.	SEC ITEM CODE
NAME	O.D.					
MERLIN	17.35	19.0	33.0	350	45	908202063
QUAIL	11.34	13.5	25.4	300	36	908202061
QUAD. MESSENGER	14.31	15.5	30.0	350	45	908202062

TECHNICAL DATA

Material: Extruded Aluminum Sleeve

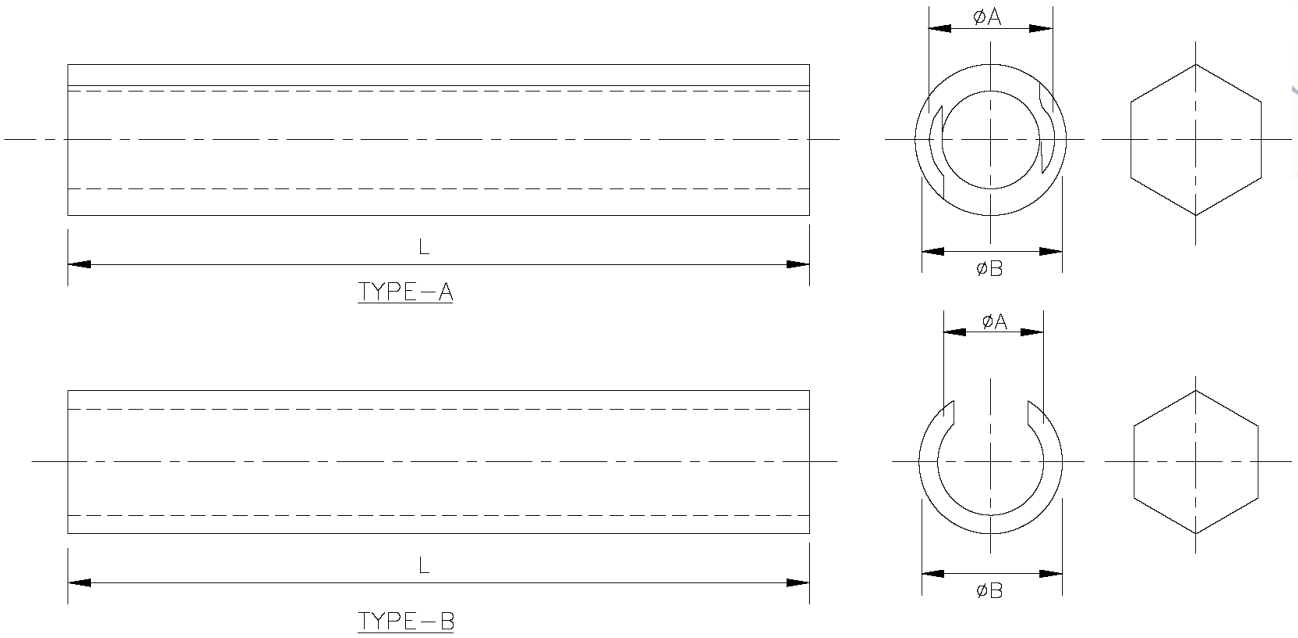
Slip Strength: 95F UTS of respective conductor

Tin Coating Thickness: 20µm

Notes:

1. The lengths noted is the minimum length acceptable to meet the required UTS.
2. Barrel shall be pre-filled with conductive oxide-inhibiting compound then capped with plastic plugs.

FIG. 32: FULL TENSION COMPRESSION SLEEVE (MID-SPAN JOINT) W/O STEEL SLEEVE



CONDUCTOR DETAILS		ØA	ØB	LENGTH MIN.	TYPE	UTS (kN) MIN.	SEC ITEM CODE
NAME	O.D.						
MERLIN	17.37	19.0	33.0	295	A	45	908202058
QUAIL	11.34	13.5	25.4	255	B	36	908202057
QUAD. MESSENGER	14.31	15.5	30.0	275	A	45	908202059

TECHNICAL DATA

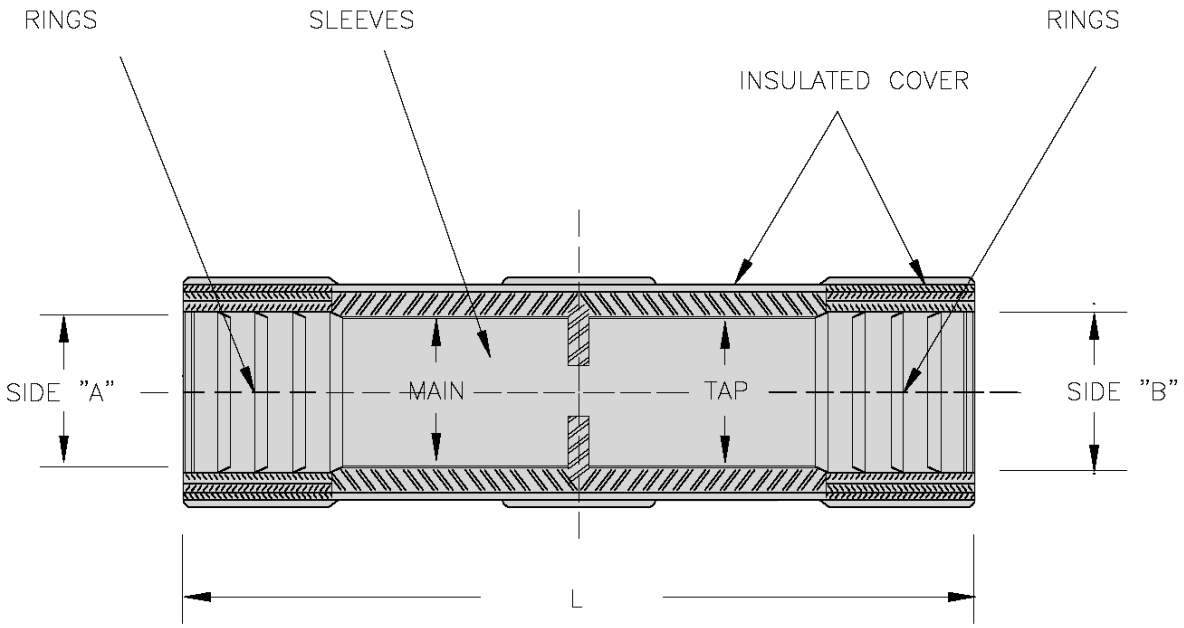
Material: Extruded Aluminum Tube Section

Slip Strength: 95TS of respective conductor

Tin Coating Thickness: 20µm

Pre-filled with conductive oxide-inhibiting compound then capped with plastic plugs.

FIG. 33: REPAIR SLEEVES



CONDUCTOR SIZE		LENGTH (L)	SEC ITEM CODE
SIDE "A"	SIDE "B"		
120 mm²	120 mm²	150 mm	908202064
120 mm²	50 mm²	150 mm	908202060
50 mm²	50 mm²	100 mm	908202066

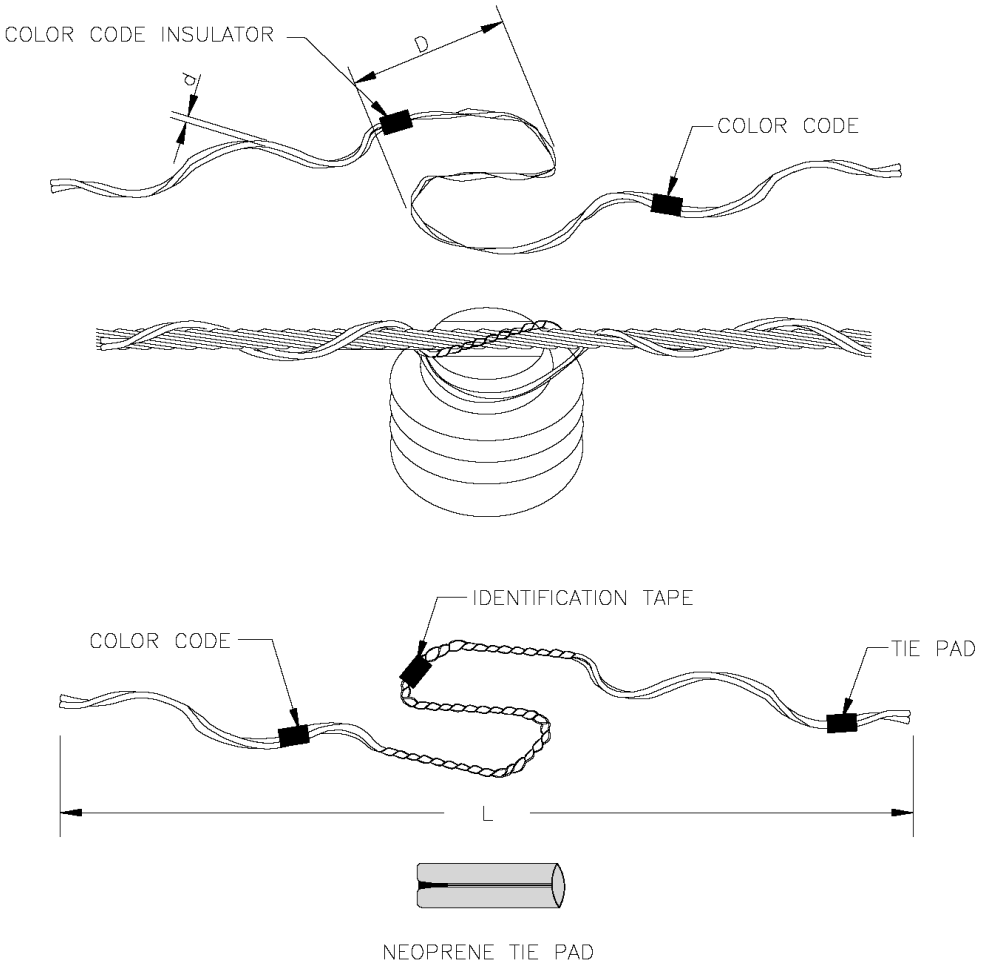
TECHNICAL DATA

Material: Extruded Aluminum Sleeve

Insulation: PVC

Pre-filled with conductive oxide-inhibiting compound then capped with plastic plugs

FIG. 34: INSULATED TYPE SLEEVE (NON-TENSION) FOR CONNECTING QUADRUPLEX CABLES

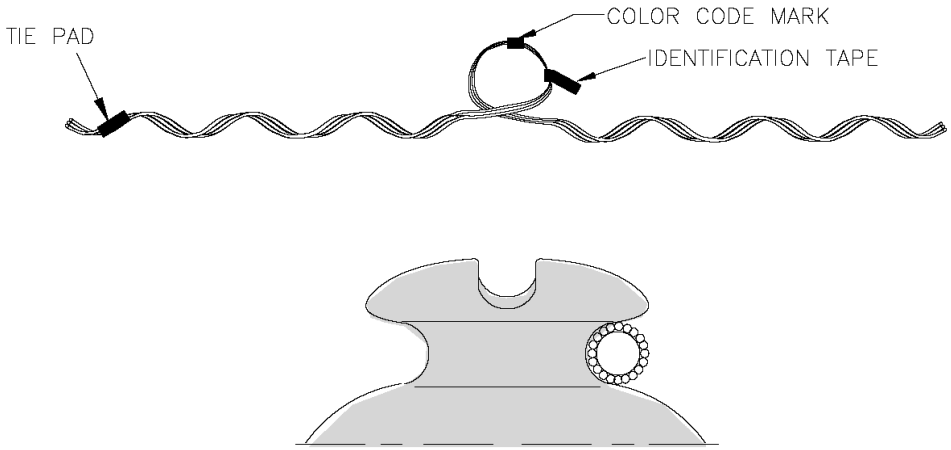


CONDUCTOR DETAILS		ROD DIA.	LENGTH (L)	NO. OF STRANDS	COLOR CODE	REMARKS	SEC ITEM CODE
NAME	O.D.						
MERLIN	17.35	3.0	730	2	WHITE	W/O ARMOR ROD	908202077
MERLIN	17.35	3.0	915	4	GREEN	WITH ARMOR ROD	908202072
QUAIL	11.34	2.59	635	2	BLUE	W/O ARMOR ROD	908202076
QUAIL	11.34	3.0	815	2	RED	WITH ARMOR ROD	908202075

NOTE:–

– MATERIAL: ALLUMINIUM COATED STEEL WIRE

FIG. 35: PREFORMED LINE POST INSULATOR TOP TIE



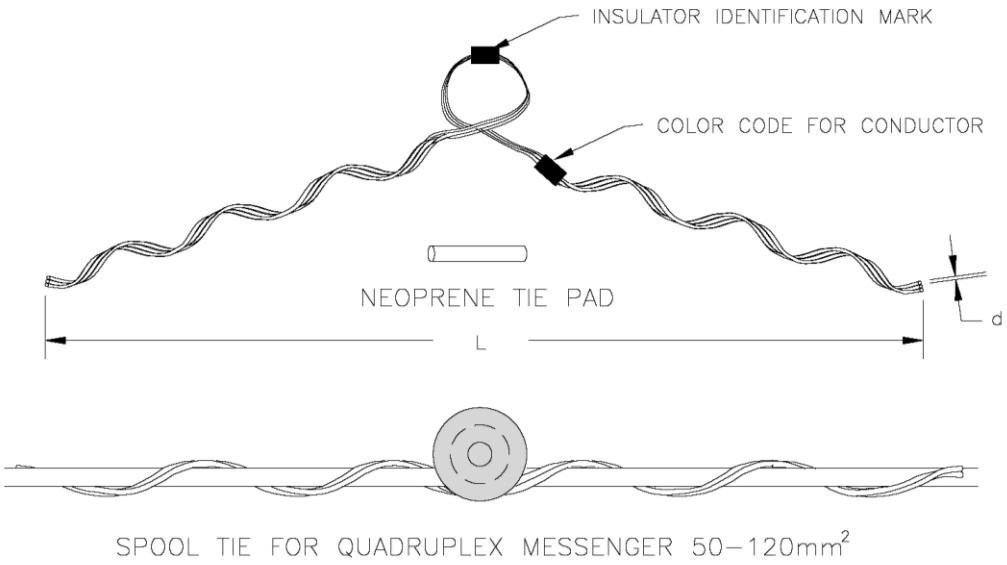
PREFORMED LINE TIES, SIDE GROOVED, SINGLE SUPPORT

CONDUCTOR DETAILS		ROD DIA.	LENGTH (L)	NO. OF STRANDS	COLOR CODE	REMARKS	SEC ITEM CODE
NAME	O.D.						
MERLIN	17.35	3.0	730	2	WHITE	W/O ARMOR ROD	908202071
MERLIN	17.35	3.0	735	4	GREEN	WITH ARMOR ROD	908202078
QUAIL	11.34	2.59	635	2	BLUE	W/O ARMOR ROD	908202073
QUAIL	11.34	3.0	660	2	RED	WITH ARMOR ROD	908202074

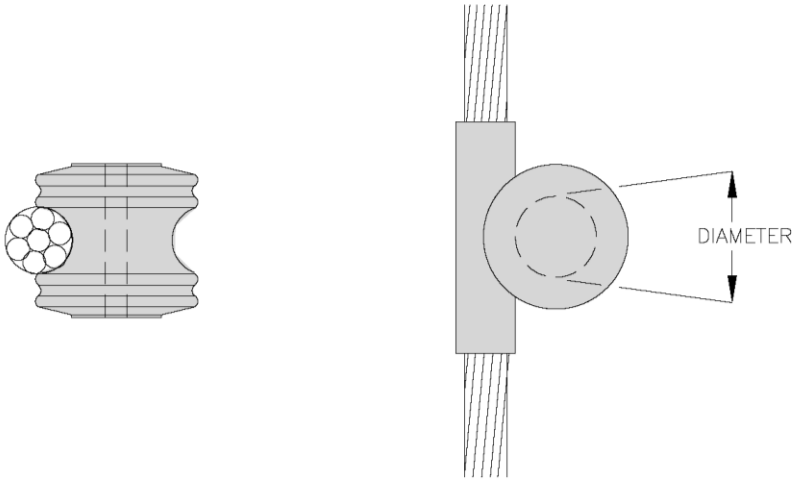
NOTE:–

– MATERIAL: ALLUMINIUM COATED STEEL WIRE

FIG. 36: PREFORMED LINE POST INSULATOR SIDE TIE

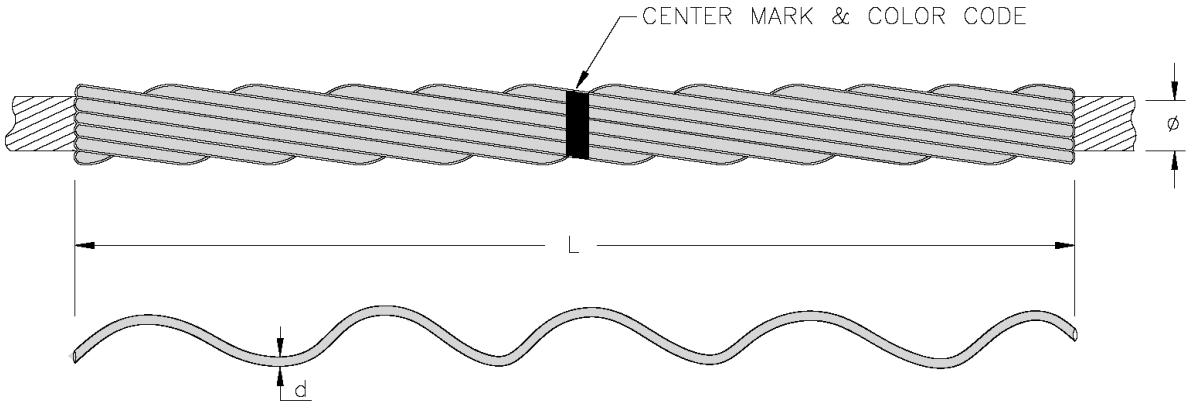


SPOOL TIE FOR QUADRUPLEX MESSENGER 50–120mm^2



CONDUCTOR	MATERIAL	NO. OF STRANDS	ROD DIA "d"
QUADRUPLEX MESSENGER	GALVANIZED STEEL	4	3.51

FIG. 37: SPOOL INSULATOR SIDE TIE (908202079)

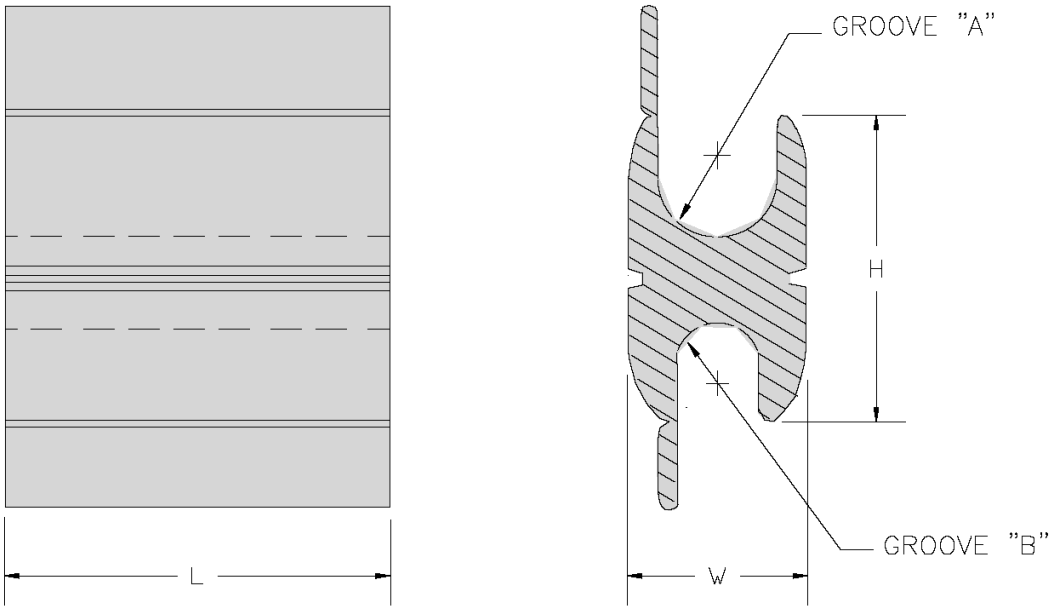


CONDUCTOR ACSR/AW	DESCRIPTION						SEC ITEM CODE
	CONDUCTOR RANGE, DIA. (Ø)	AREA mm^2	ROD DIA. (d)	APPROXIMATE APPLIED LENGTH (L)	NUMBER OF RODS	COLOR CODE	
MERLIN	17.2-17.8	170.5	5.18	1730	12	BLUE	908202050
QUAIL	11.1-12.4	67.44	4.24	1370	10	YELLOW	908202051

NOTES

1. Material: Aluminum Alloy, resistant to oxidation throughout its shelf-life
2. Tolerance of Rod Diameter: ±7%

FIG. 38: PREFORMED ARMOR RODS

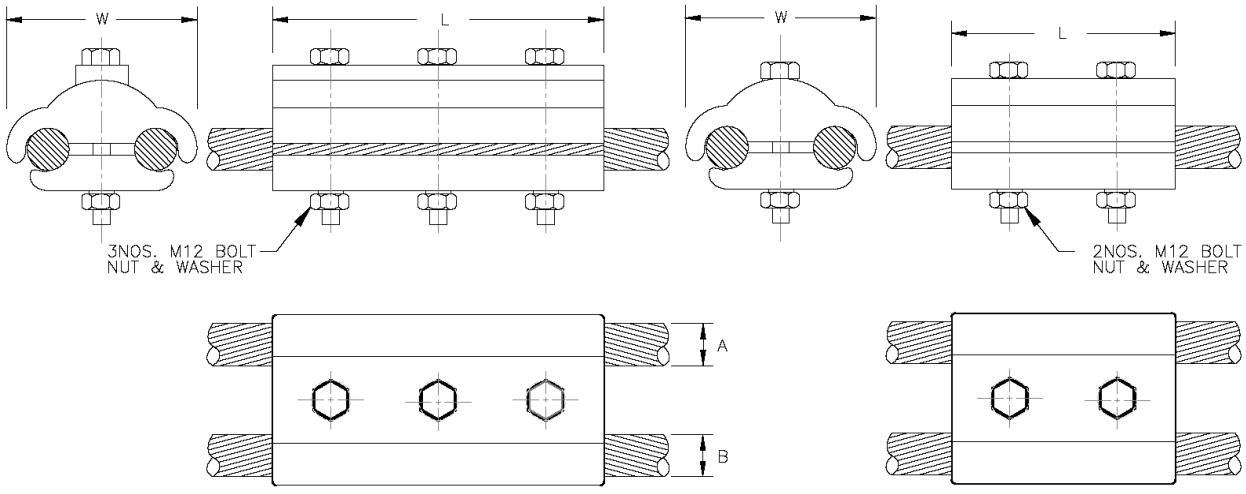


CONDUCTOR		DIMENSIONS			SEC ITEM CODE
GROOVE "A"	GROOVE "B"	H	L	W	
MERLIN	MERLIN	46	115	32	908202183
MERLIN	QUAIL	46	115	32	908202185
QUAIL	QUAIL	36	47	21	908202187
QUADRUPLEX MESSENGER 4x120 mm² AL.	QUADRUPLEX MESSENGER 4x120 mm² AL.	36	51	21	908202196
QUADRUPLEX MESSENGER 4x120 mm² AL.	QUADRUPLEX MESSENGER 4x50 mm² AL.	36	51	21	908202210

NOTES

1. Tin Coating Thickness: 20µm
2. Grooves are pre-filled with conductive oxide-inhibiting compound

FIG. 39: PARALLEL GROOVE COMPRESSION TYPE CONNECTORS



CLAMP FOR MERLIN

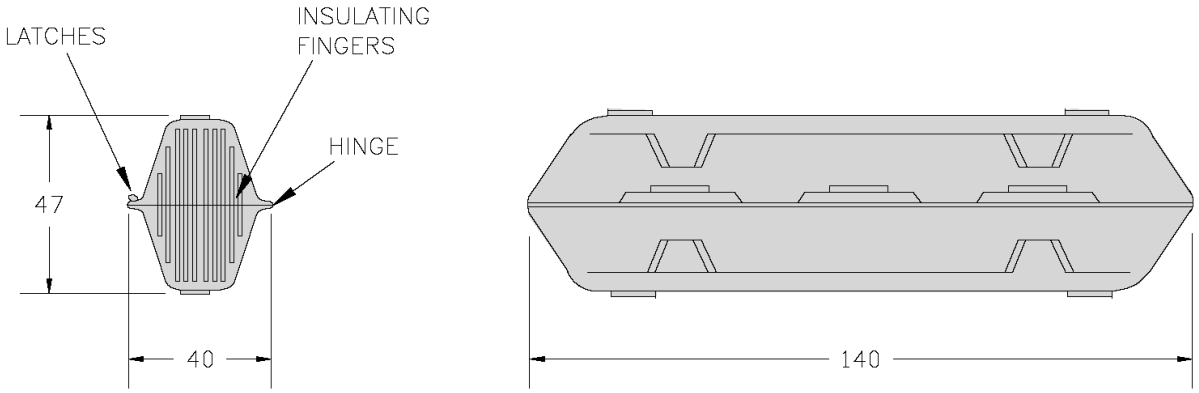
CLAMP FOR QUAIL

CONDUCTOR		DIMENSIONS MIN.		BOLTS		SEC ITEM CODE
GROOVE "A"	GROOVE "B"	L	W	NOS.	DIA.	
MERLIN	MERLIN	110	60	3	12	908202209
MERLIN	QUAIL	110	60	3	12	908202235
QUAIL	QUAIL	80	50	2	12	908202200

NOTES

1. Body: Aluminum Alloy
2. Body Tin Coating Thickness: 20µm
3. Fasteners (nuts, bolts, washers): Stainless Steel (Grade: A2-80)
4. Tolerance: ±5% on all dimensions
5. Grooves: Knurled and pre-filled with conductive oxide-inhibiting compound

FIG. 39A: PARALLEL GROOVE CONNECTOR BOLTED TYPE

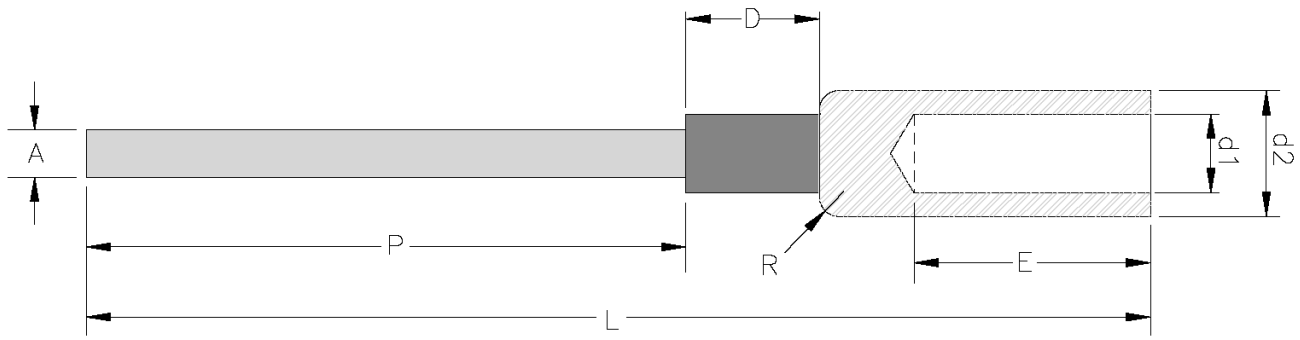


L.V COVER CONNECTOR FOR

QUADRUPLEX MESSENGER 4X120mm² Al.	QUADRUPLEX MESSENGER 4X120mm² Al.
QUADRUPLEX MESSENGER 4X120mm² Al.	QUADRUPLEX MESSENGER 4X50mm² Al.

NOTE:
MATERIAL : THERMOPLASTIC
COLOR : BLACK

FIG. 40: LV CONNECTOR COVER (INSULATING CAP) (908202184)



CONDUCTOR	DIMENSIONS								SEC ITEM CODE
	A	P	L	D	E	d1	d2	R	
MERLIN	12	152	270	34	60	20	32	5	908202034
QUAIL	8	152	240	20	52	13.5	22	4	908202035

NOTE :

L – TOTAL LENGTH

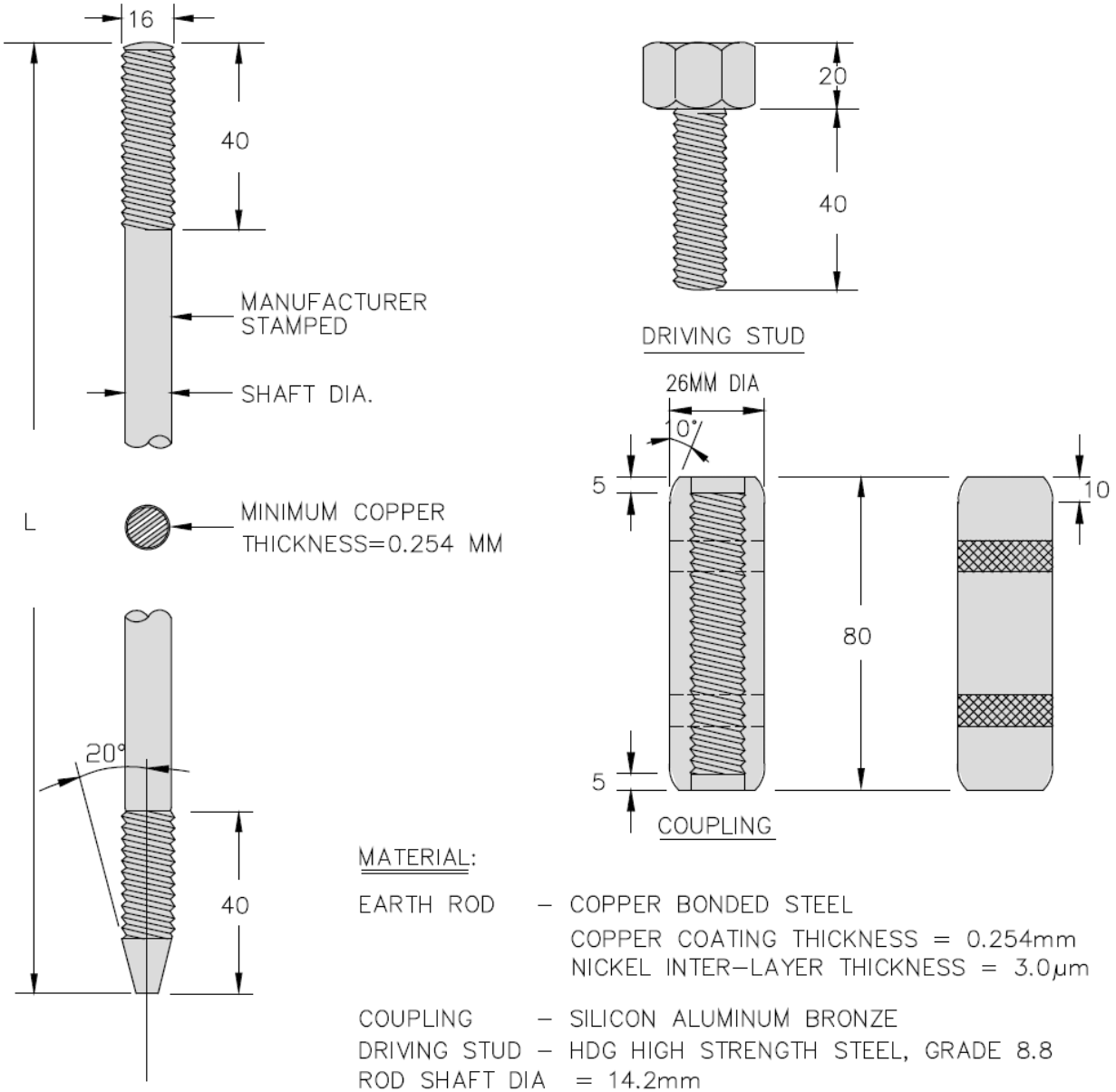
P – LENGTH OF PIN TYPE CONNECTOR

A – DIAMETER OF PIN TYPE CONNECTOR

NOTES

1. Barrel: pre-filled with conductive oxide-inhibiting compound then capped with plastic plug.
2. Tin Coating Thickness: 20µm

FIG. 42: TERMINAL PLUG



MATERIAL:

EARTH ROD – COPPER BONDED STEEL
COPPER COATING THICKNESS = 0.254mm
NICKEL INTER–LAYER THICKNESS = 3.0µm

COUPLING – SILICON ALUMINUM BRONZE
DRIVING STUD – HDG HIGH STRENGTH STEEL, GRADE 8.8
ROD SHAFT DIA = 14.2mm

LENGTH OF GROUND ROD NOMINAL DIAMETER – 16 mm	SEC ITEM CODE
1200 mm	908202053
2400 mm	908202054

FIG. 43: GROUNDING ROD, 16 mm DIAMETER

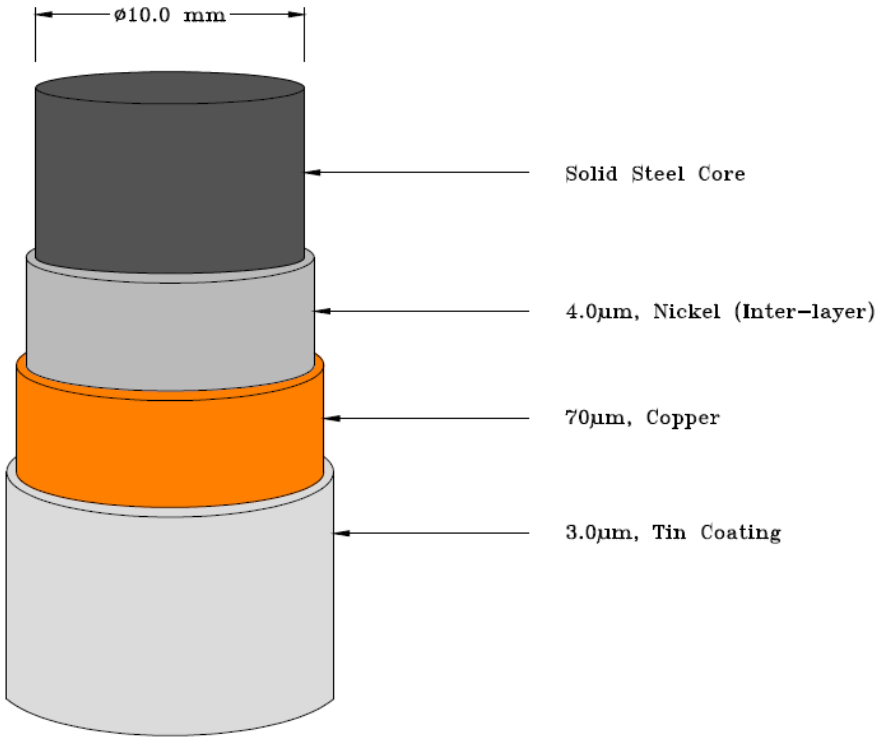
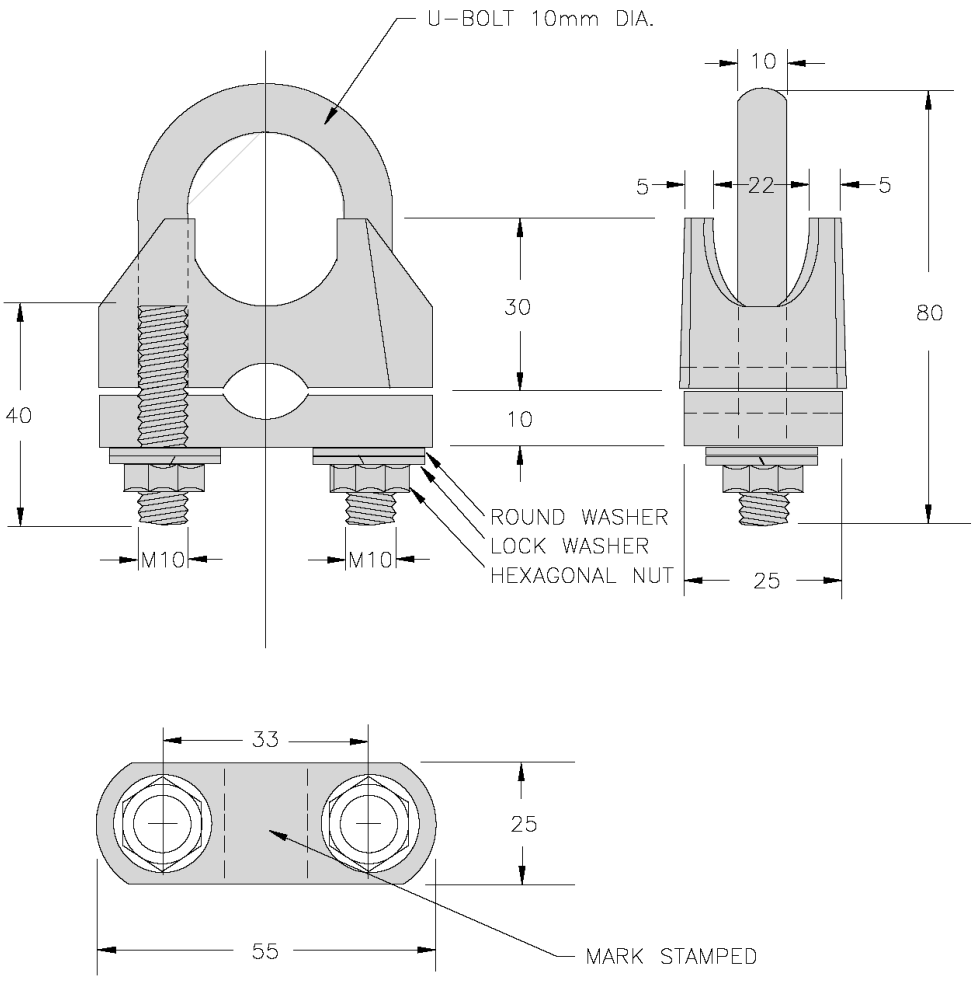


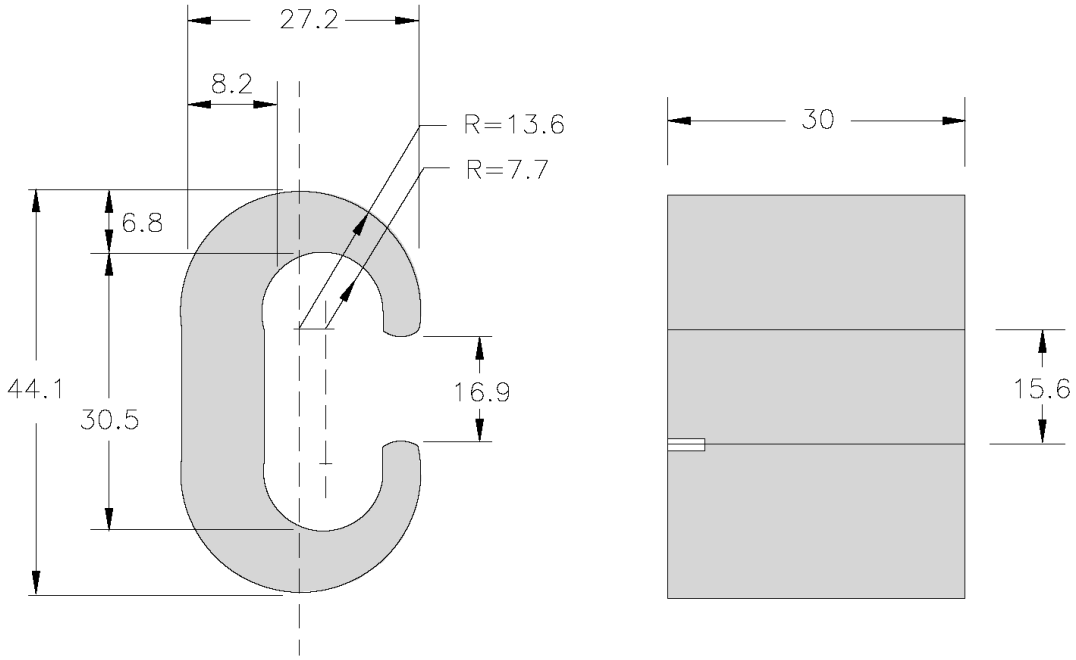
FIG. 43A: TINNED COPPER-BONDED STEEL GROUNDING CONDUCTOR



MATERIAL :
U–BOLT AND HEXAGONAL NUT – SILICON BRONZE (C–65100)
BODY – PHOSPHOR BRONZE (C–54400)
ROUND WASHER – COPPER PLATED BRASS
SPRING WASHER – STAINLESS STEEL (SS 304)

DIMENSIONS:
CONDUCTOR RANGE 35–70mm2
GROUND ROD NOMINAL DIA. 16mm
U–BOLT DIA. 10mm ±1mm

FIG. 44: GROUND ROD CLAMP U-BOLT TYPE (908202098)



TECHINICAL DATA:
MATERIAL : COPPER
FINISHING : ETCHED
APPLICATION : COPPER C–TAP FOR GROUNDING APPLICATION
RUN – 110 –125 mm2
GROUND ROD : 5/8" (16mm)
TAP – 25–125 mm2

FIG. 45: CRIMPIT COPPER CONNECTOR (908202189)

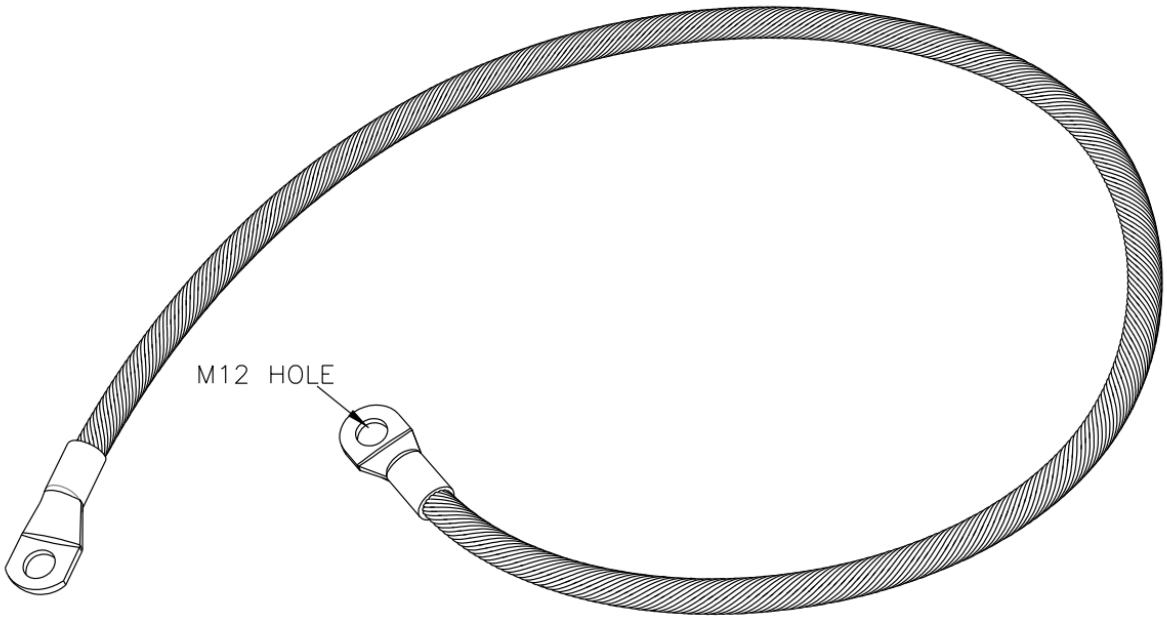
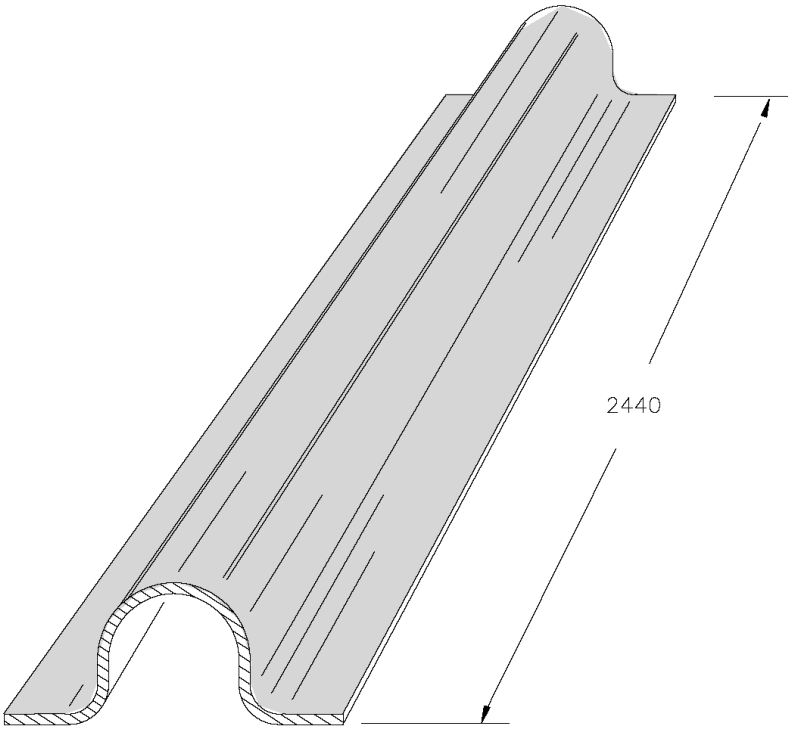


FIG. 46: 35 mm² FLEXIBLE MULTI-STRANDED COPPER WIRE ROPE - 500 mm LENGTH WITH TIN-PLATED COPPER LUGS (908202212)



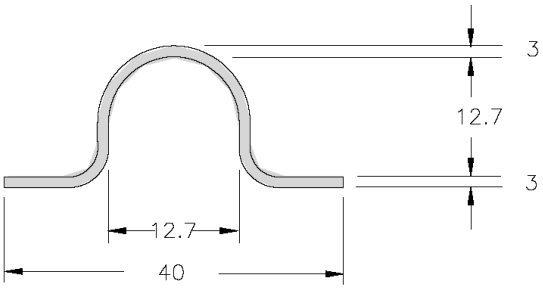


FIG. 47: PVC GROUND WIRE GUARD (908202192)

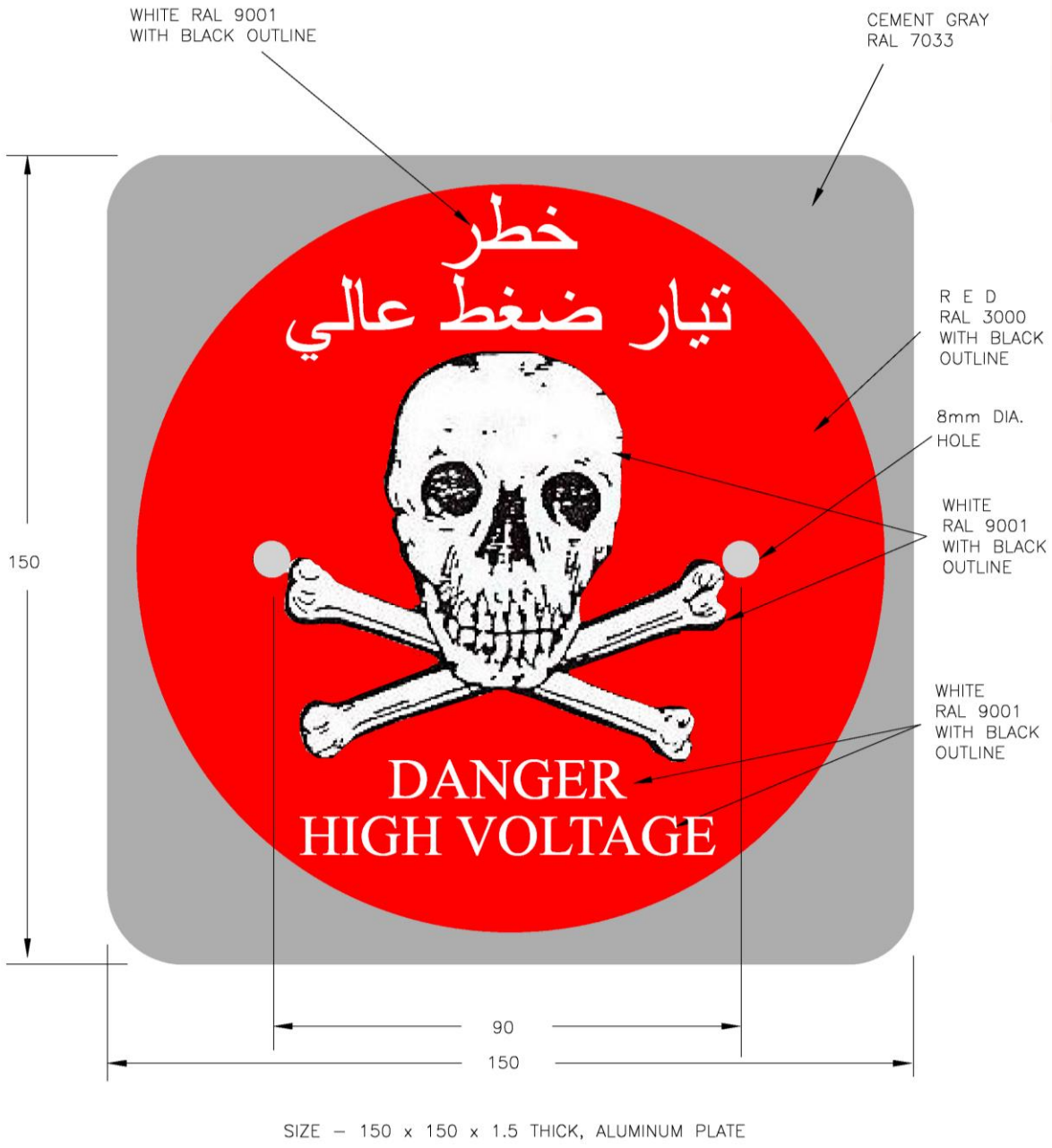
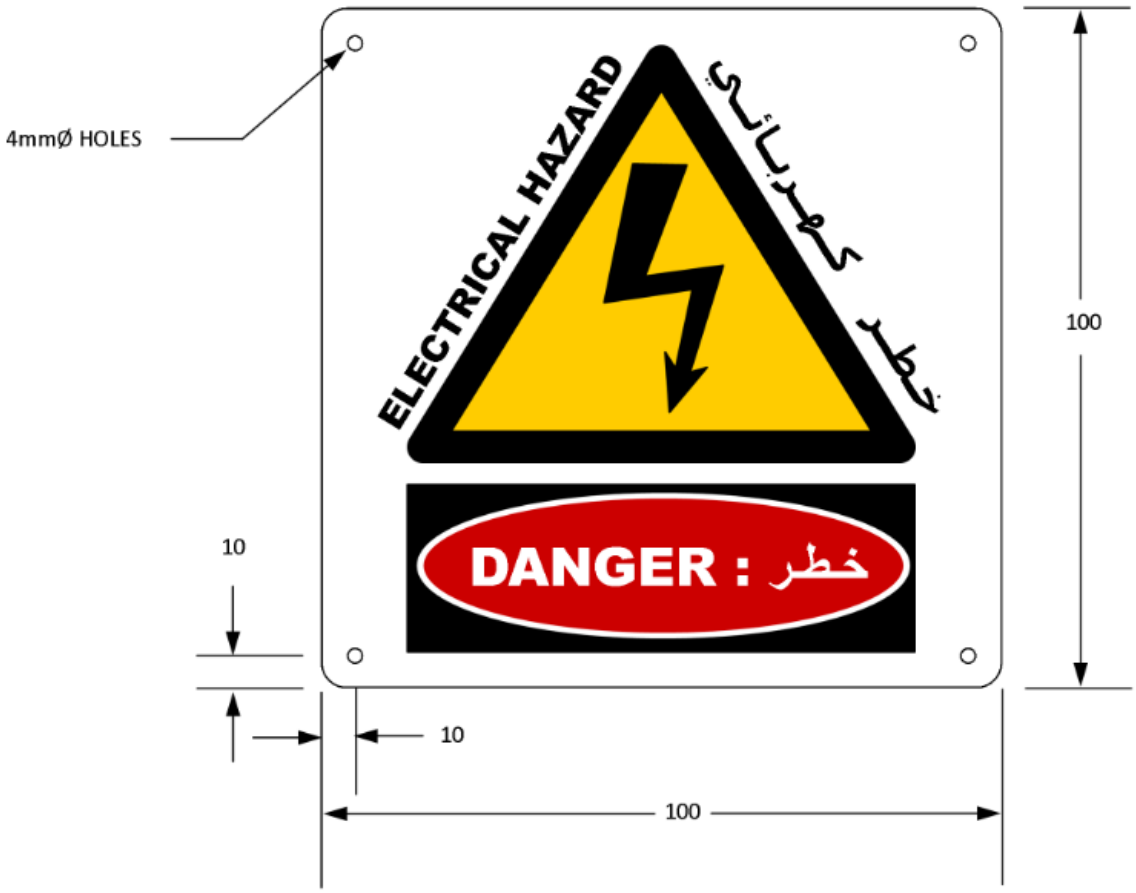


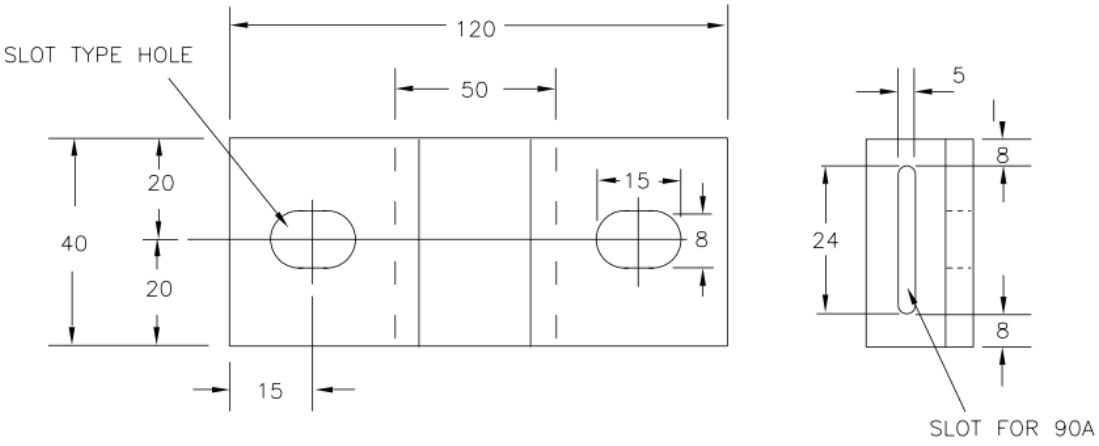
FIG. 49: DANGER SIGN PLATE FOR MEDIUM-VOLTAGE EQUIPMENT (908202056)



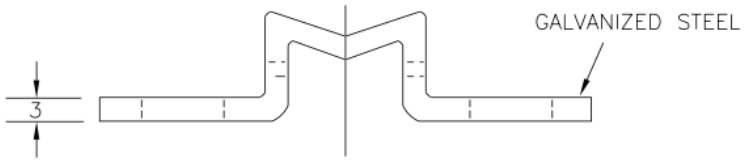
ALUMINUM PLATE: 1.5 mm THICK

- RAL 9005 JET BLACK
- RAL 1023 TRAFFIC YELLOW
- RAL 3001 SIGNAL RED
- RAL 9016 TRAFFIC WHITE

FIG. 49A: DANGER SIGN PLATE FOR LOW-VOLTAGE EQUIPMENT



DANGER SIGN POLE MOUNTING BRACKET



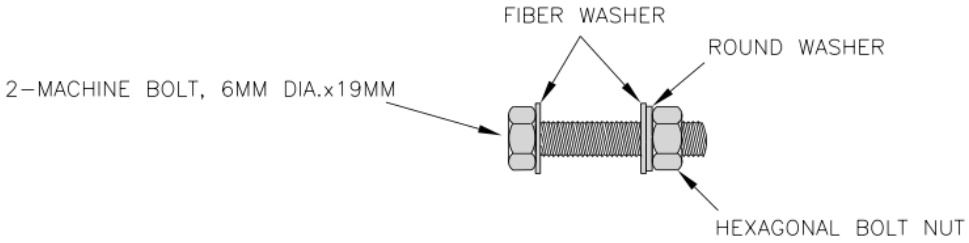


FIG. 50: DANGER SIGN MOUNTING BRACKET (908202099)

FIGURE – 1 – BASE ALUMINIUM PAINTED BLACK, THICKNESS 1MM
FIGURE – 2 – NUMBERS AND LETTERS, CUT THROUGH,
PAINTED YELLOW – THICKNESS 1MM.

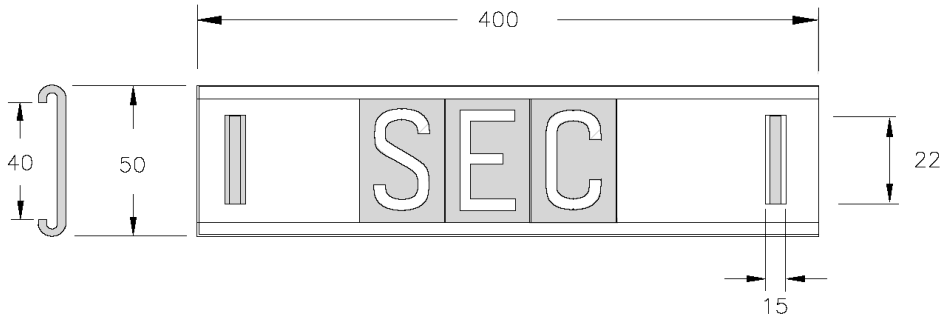


FIGURE – 1

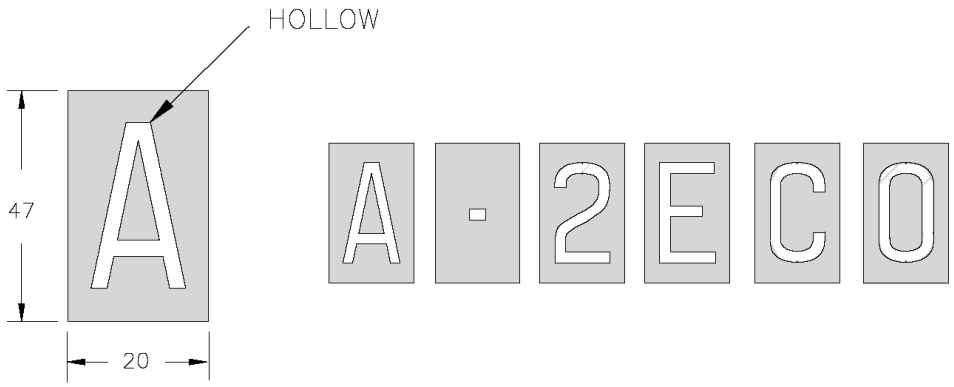


FIGURE – 2

FIG. 51: POLE NUMBERING PLATES (908202105)

FIGURE – 1 – BASE ALUMINIUM PAINTED BLACK, THICKNESS 1MM
FIGURE – 2 – NUMBERS AND LETTERS, CUT THROUGH,
PAINTED YELLOW – THICKNESS 1MM.

FIGURE – 1

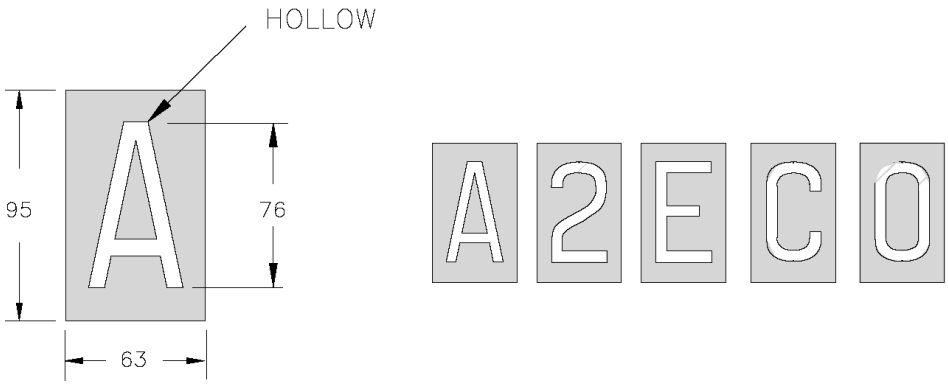
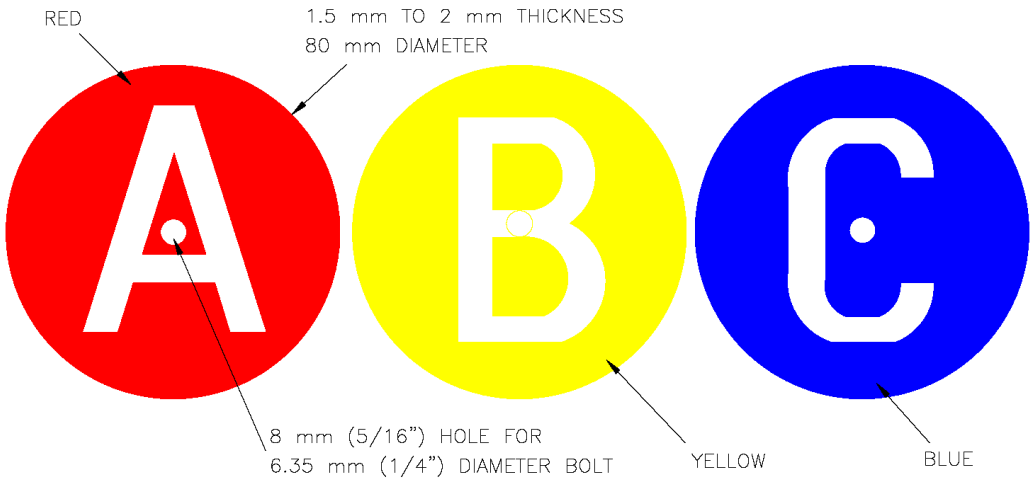


FIGURE – 2

FIG. 52: EQUIPMENT NUMBERING PLATES (908202144)

	NOT SHOWN ON PLATE BUT EQUIVALENT TO A,B,C		
LETTER "A" – RED BACKGROUND	1	R	U
LETTER "B" – YELLOW BACKGROUND	2	S	V
LETTER "C" – BLUE BACKGROUND	3	T	W
ALL LETTERS IN BLACK			



N O T E :

COLORED PHASE PLATES ARE TO BE INSTALLED ON THE FOLLOWING POLES:

- CABLE TERMINATION POLES AND DEADEND POLES WITHOUT TRANSFORMER
- TAP–OFF POLES
- PRINCIPAL ROAD CROSSING POLES
- TRANSFORMER POLES
- AUTO–RECLOSER POLES
- FUSE DISCONNECT POLES
- LOAD BREAK SWITCH POLES
- POLES WHERE CONDUCTOR FORMATION CHANGES E.G. FROM HORIZONTAL TO VERTICAL ETC.
- SECTION POLE ON LONG RUN WITHOUT THESE STRUCTURES MENTIONED ABOVE.
- EACH PHASING PLATES SHALL BE REMOVED WITH MACHINE BOLT 6.35mm (1/4") x 35mm 1 LOCK WASHER AND 1 ROUND WASHER

FIG. 53: PHASING PLATES (908202045)

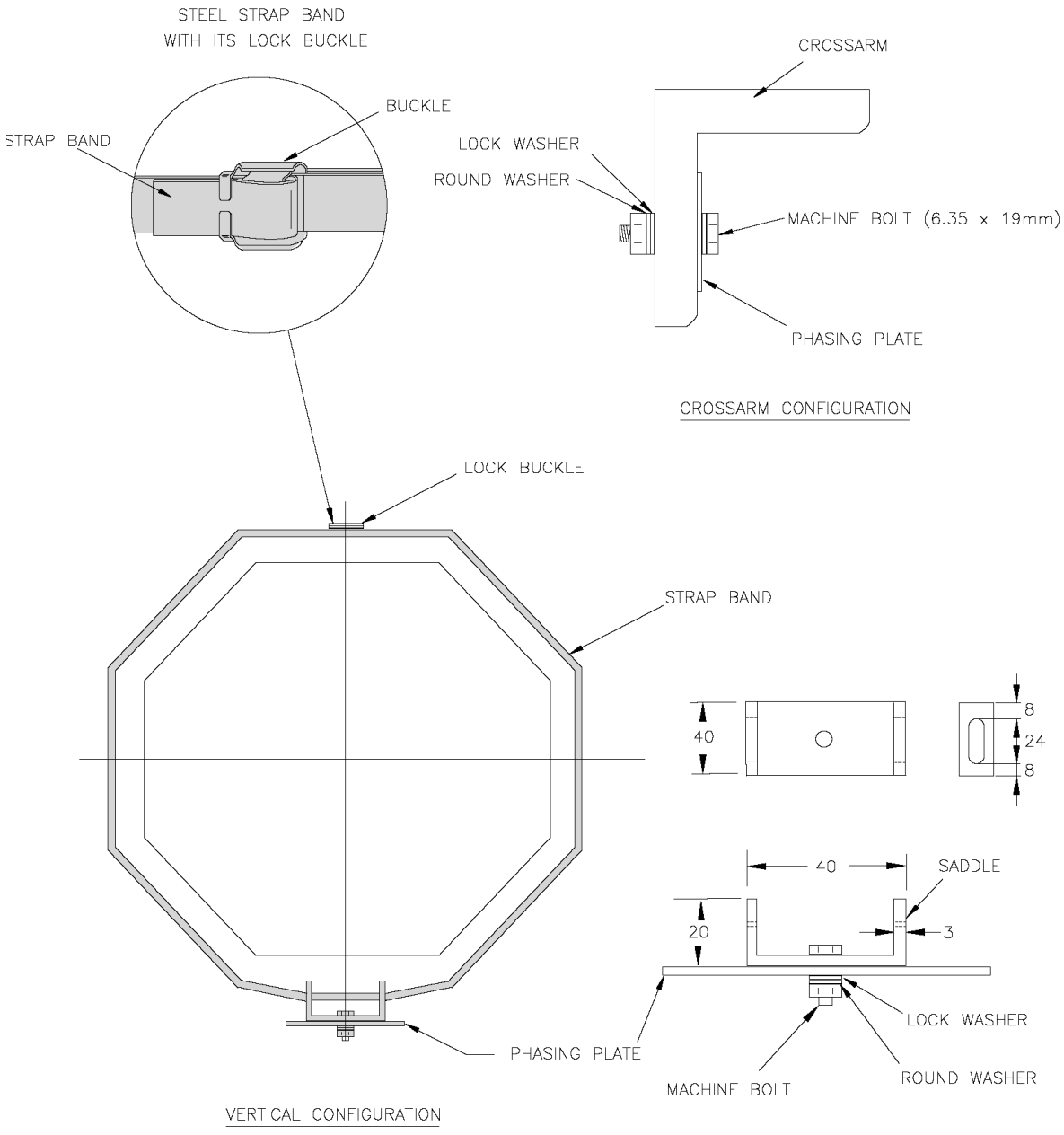
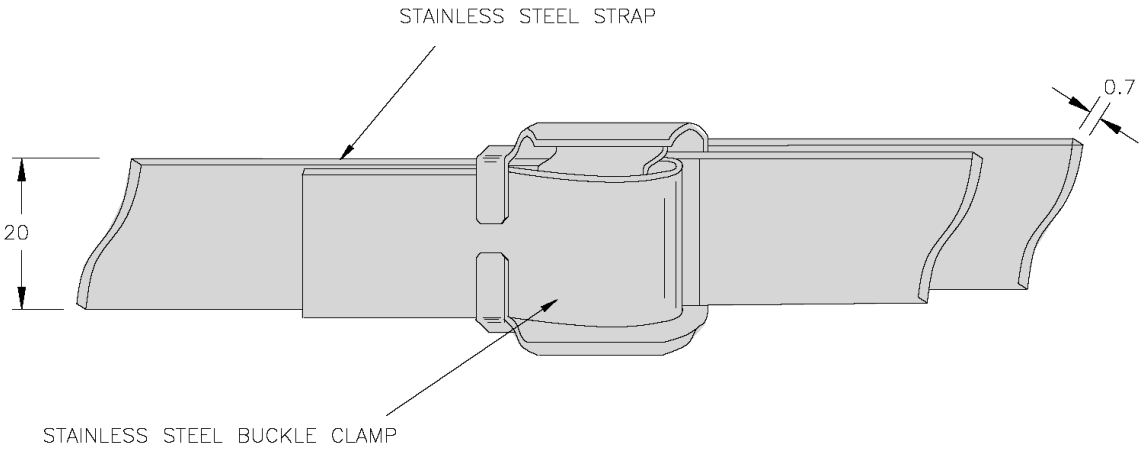
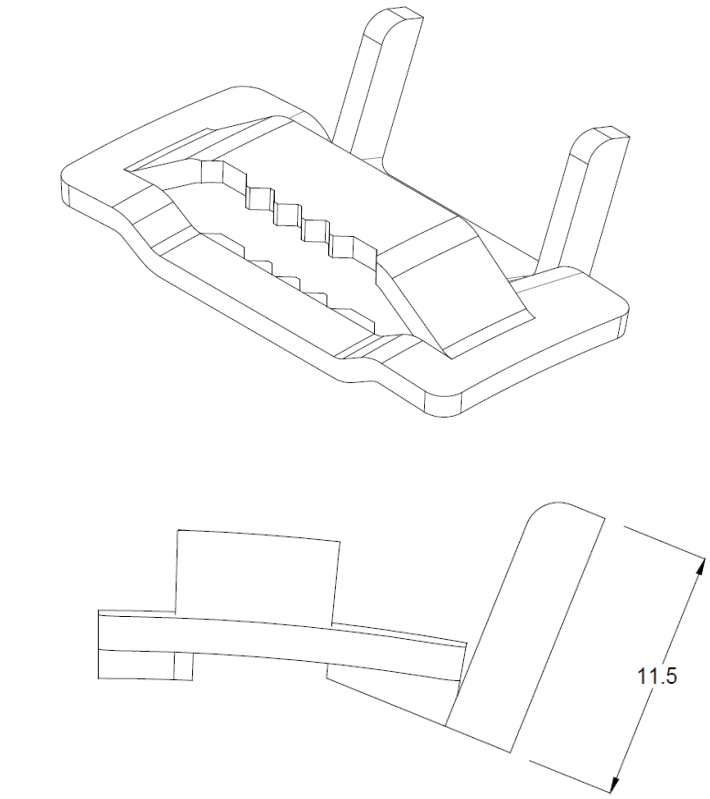


FIG. 54: PHASING PLATES MOUNTING BRACKET (908202026)



STAINLESS STEEL STRAP (20 x 0.7mm)

FIG. 55: STAINLESS STEEL STRAP (908202002)



THICKNESS : 1.5mm

FIG. 55A: STAINLESS STEEL BUCKLE LOCKING CLAMP (EAR-TYPE) FOR STAINLESS STEEL STRAP (908202027)

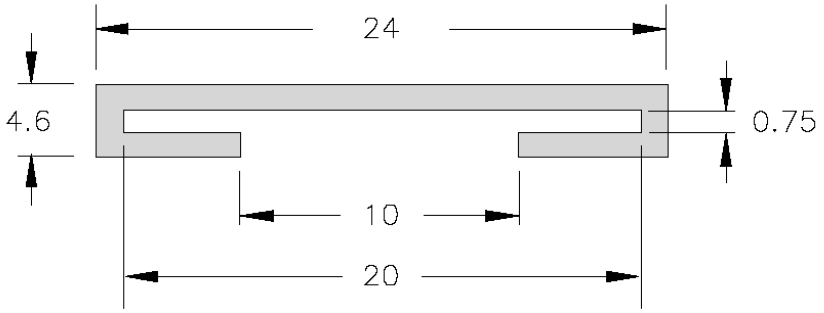
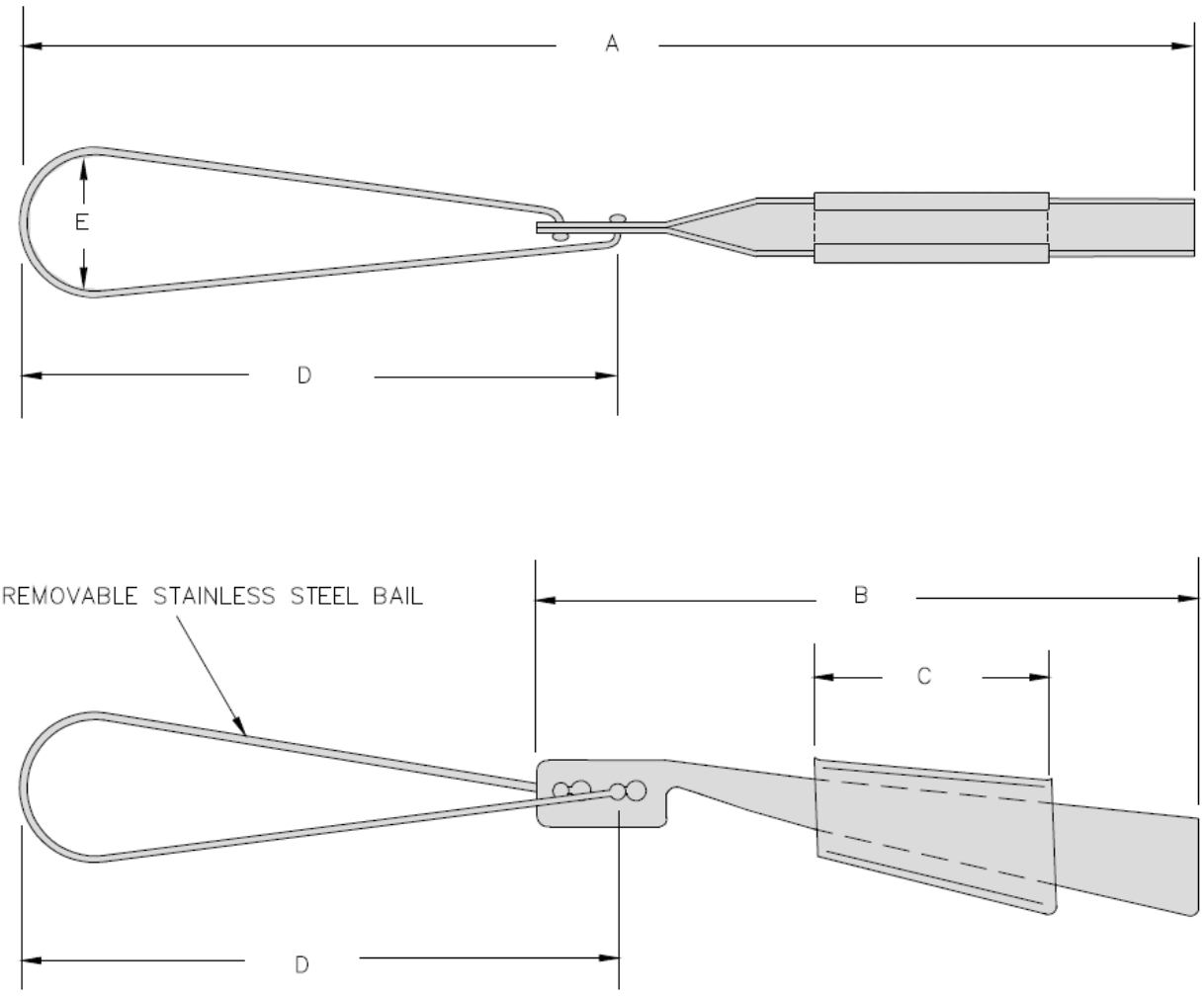


FIG. 55B: SEMI-RIGID PVC SLEEVE FOR STAINLESS STEEL STRAP (908202033)



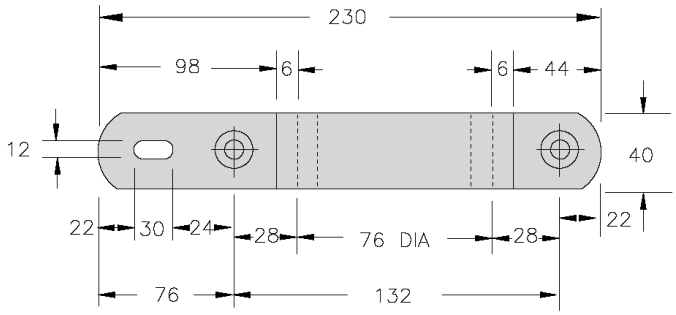
DIMENSIONS:

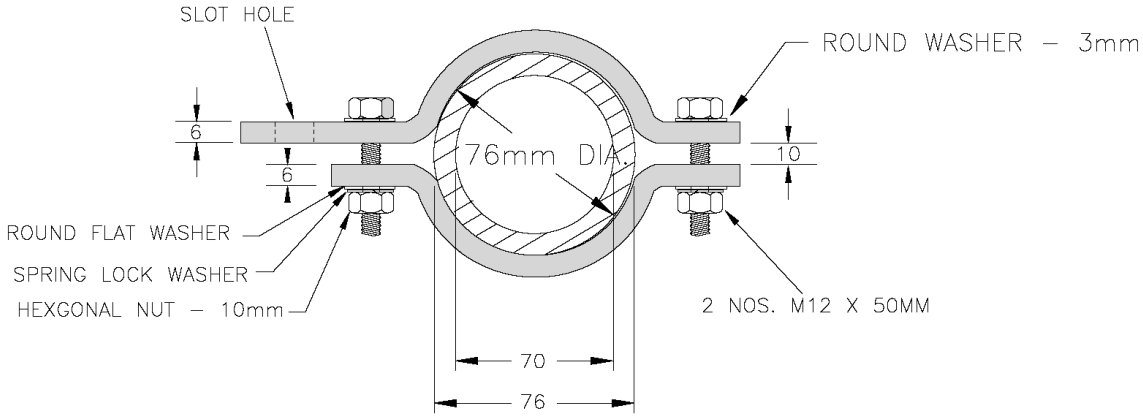
A – 430 mm
B – 185 mm
C – 100 mm
D – 275 mm
E – 60 mm

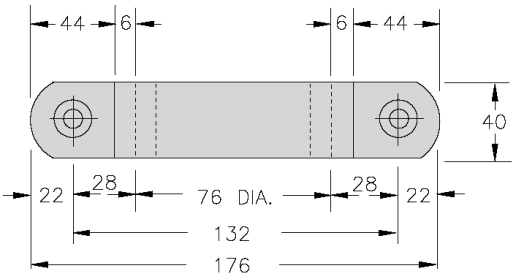
MATERIALS:

BODY AND SLIDER: ALUMINUM ALLOY
REMOVABLE BAIL: STAINLESS STEEL

FIG. 56: WEDGE GRIP WITH REMOVABLE BAIL (908202190)







MATERIAL:
STEEL HOT DIP GALVANIZED

FIG. 57: SERVICE MAST CLAMP FOR 76 mm DIAMETER STEEL PIPE (908202101)

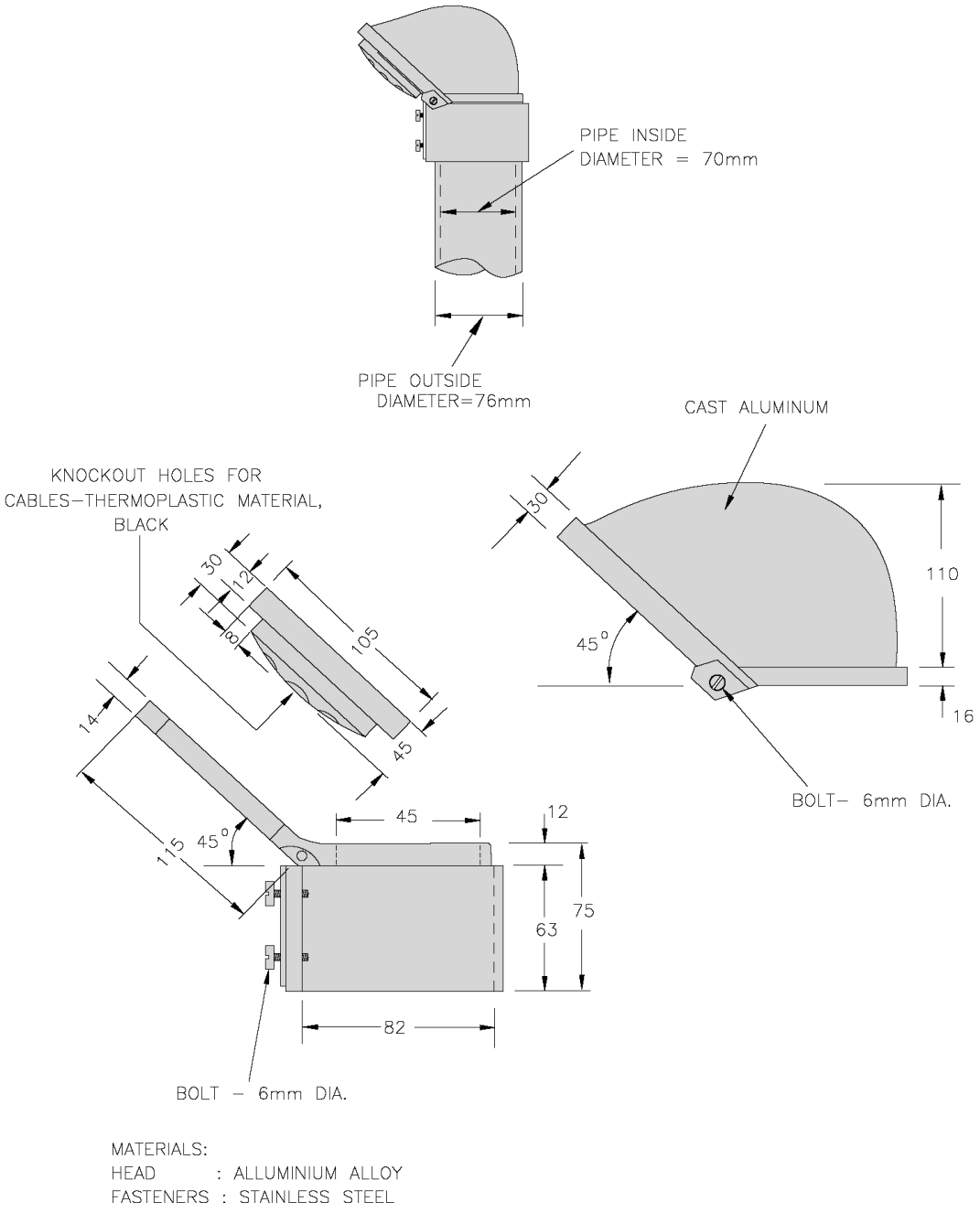


FIG. 58: SERVICE ENTRANCE HEAD FOR MAST 76 mm DIAMETER STEEL PIPE (908202194)

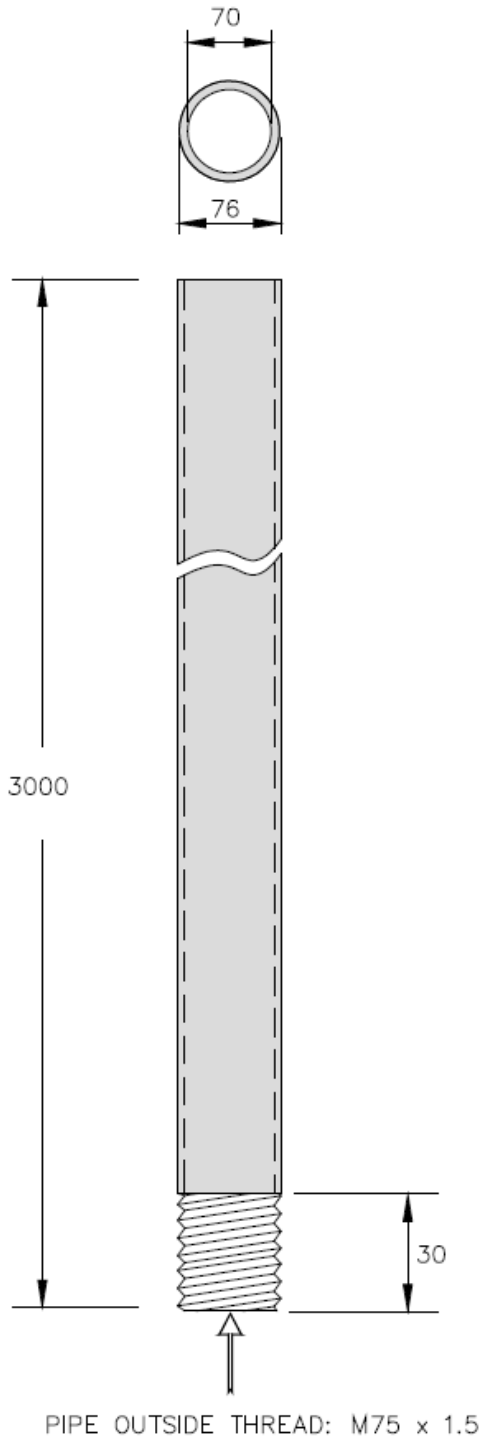


FIG. 59: SERVICE DROP STEEL PIPES (70 mm INSIDE DIAMETER) WITH 3.0 mm MINIMUM THICKNESS, ±5% TOLERANCE (908202229)

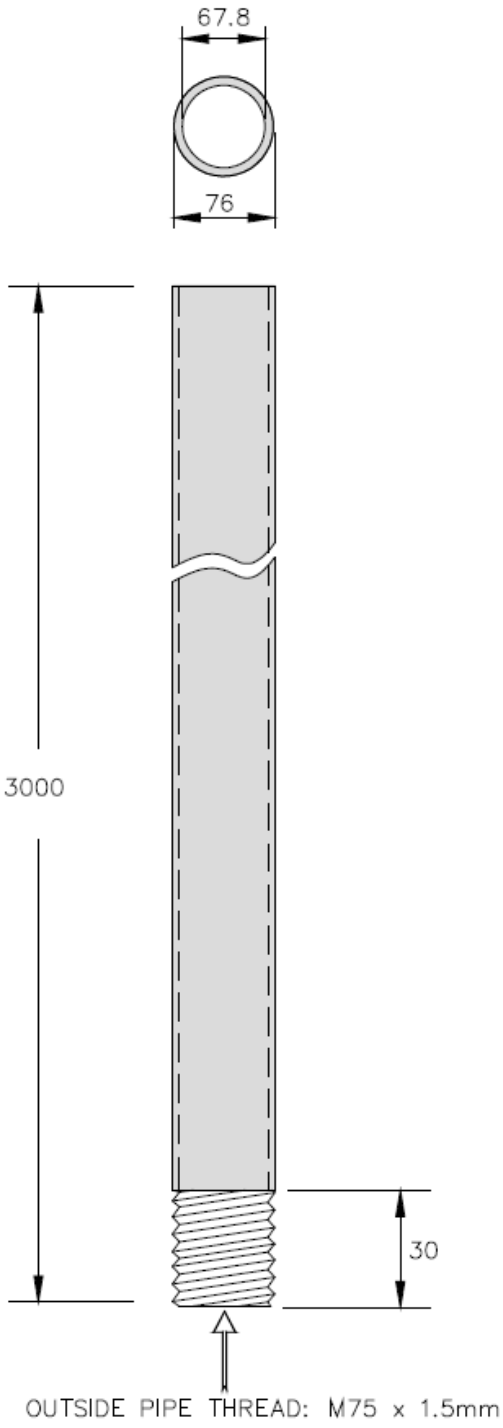
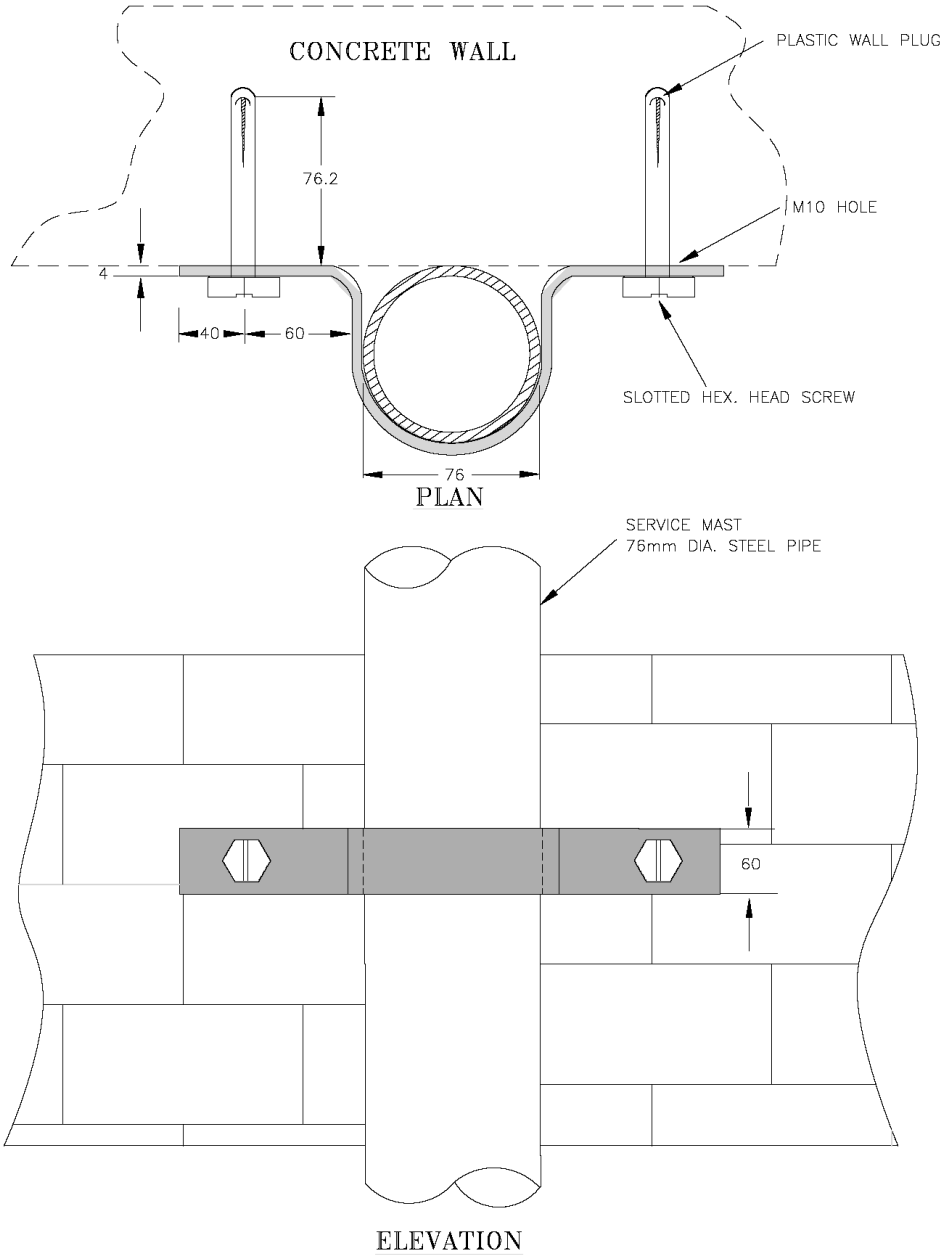
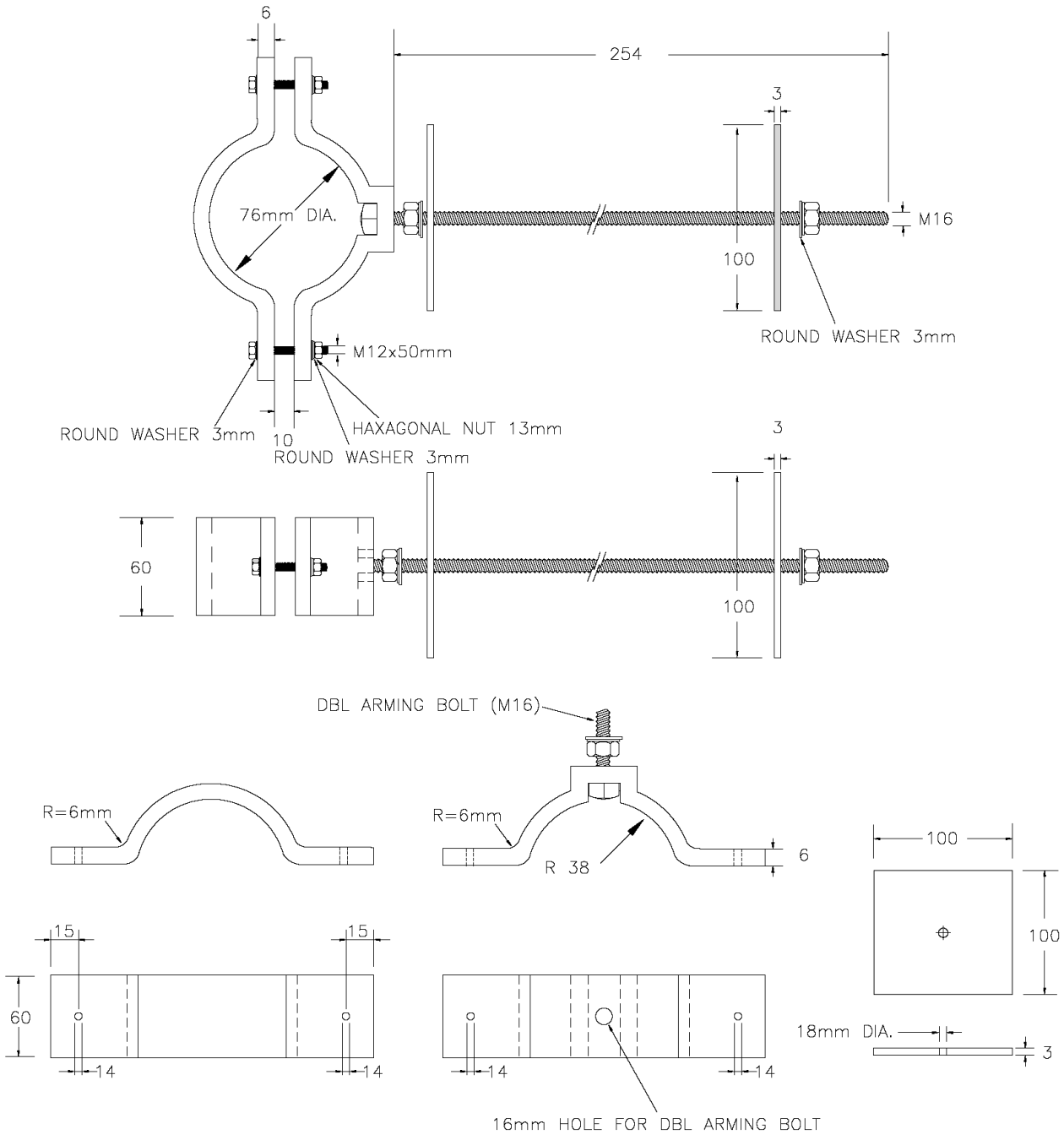


FIG. 59A: PVC/PE PIPE FOR PMT STRUCTURE H & S (76 mm OUTSIDE DIAMETER) WITH 3.6 mm MINIMUM THICKNESS, ±5% TOLERANCE (908202230)



NOTES:
MATERIAL : STEEL HOT DIP GALVANIZED
– EACH SUPPORT CLAMP SHALL BE PROVIDED WITH 2NOS. OF 76.2mm SLOTTED HEX. HEAD SCREW WITH PLASTIC WALL PLUG

FIG. 60: SERVICE MAST ON-WALL SUPPORT CLAMP (908202102)



NOTE:
MATERIAL: STEEL, HOT DIP GALVANIZED
ALL THE ABOVE PARTS ARE INCLUDED IN THE SUPPORT CLAMP

FIG. 61: SERVICE MAST THROUGH WALL SUPPORT CLAMP (908202103)

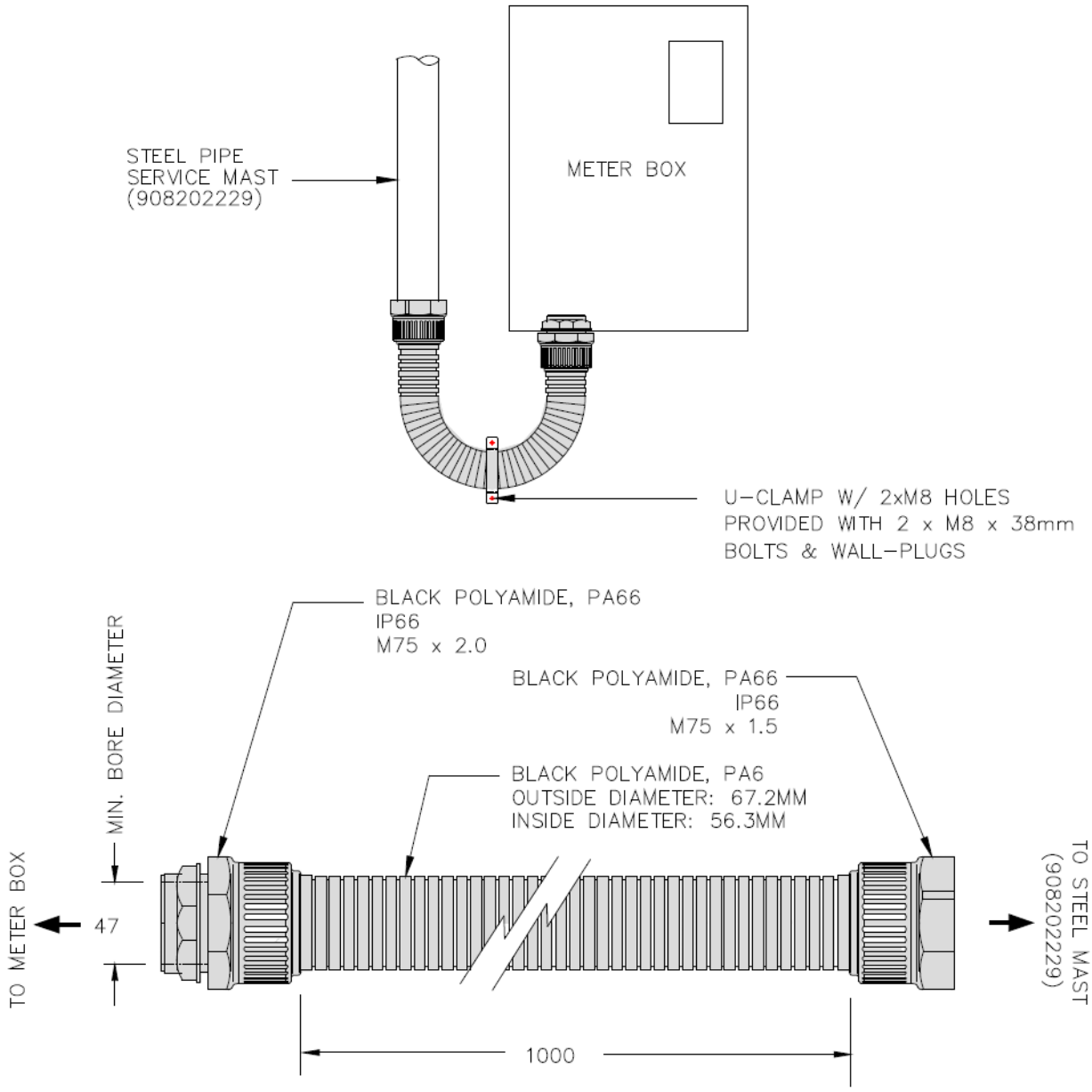
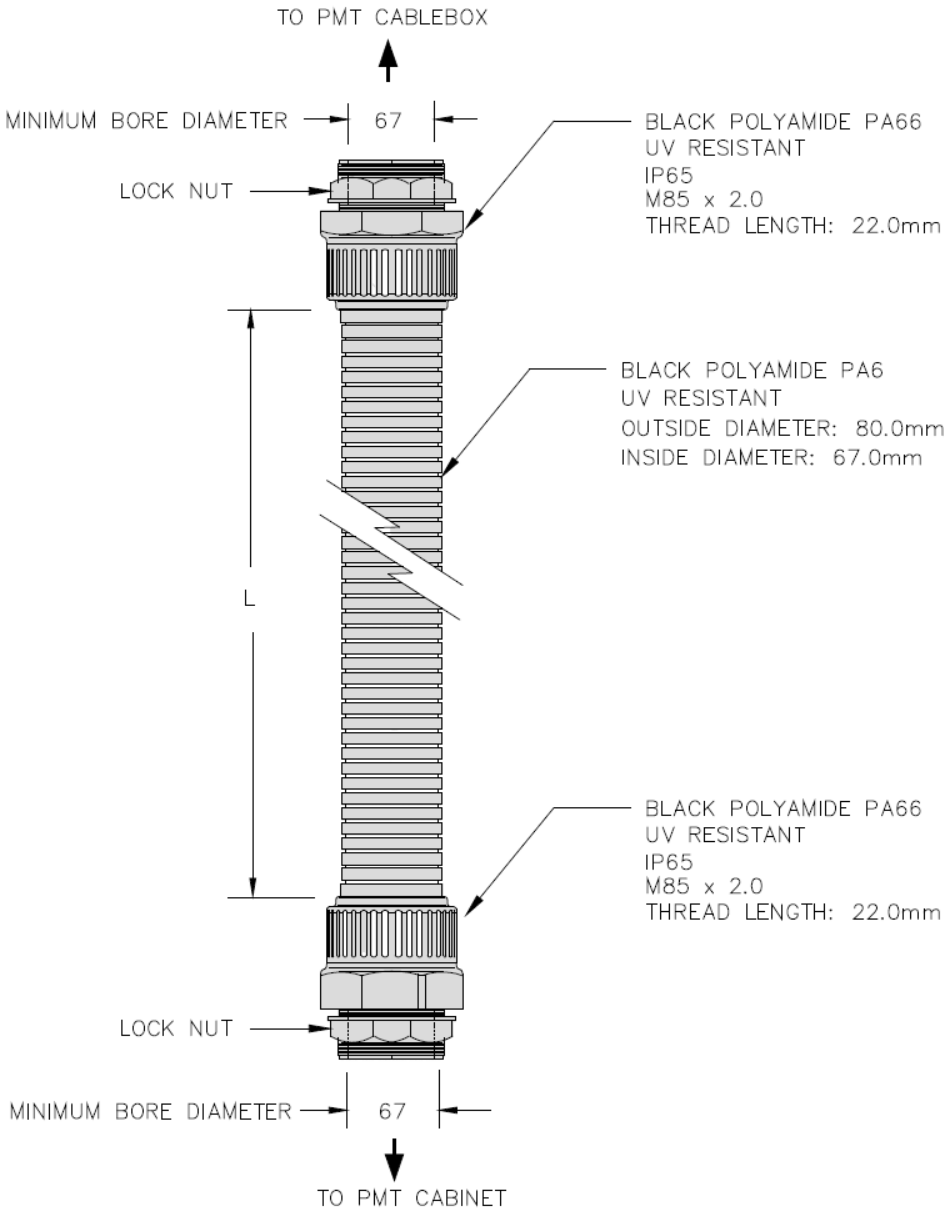
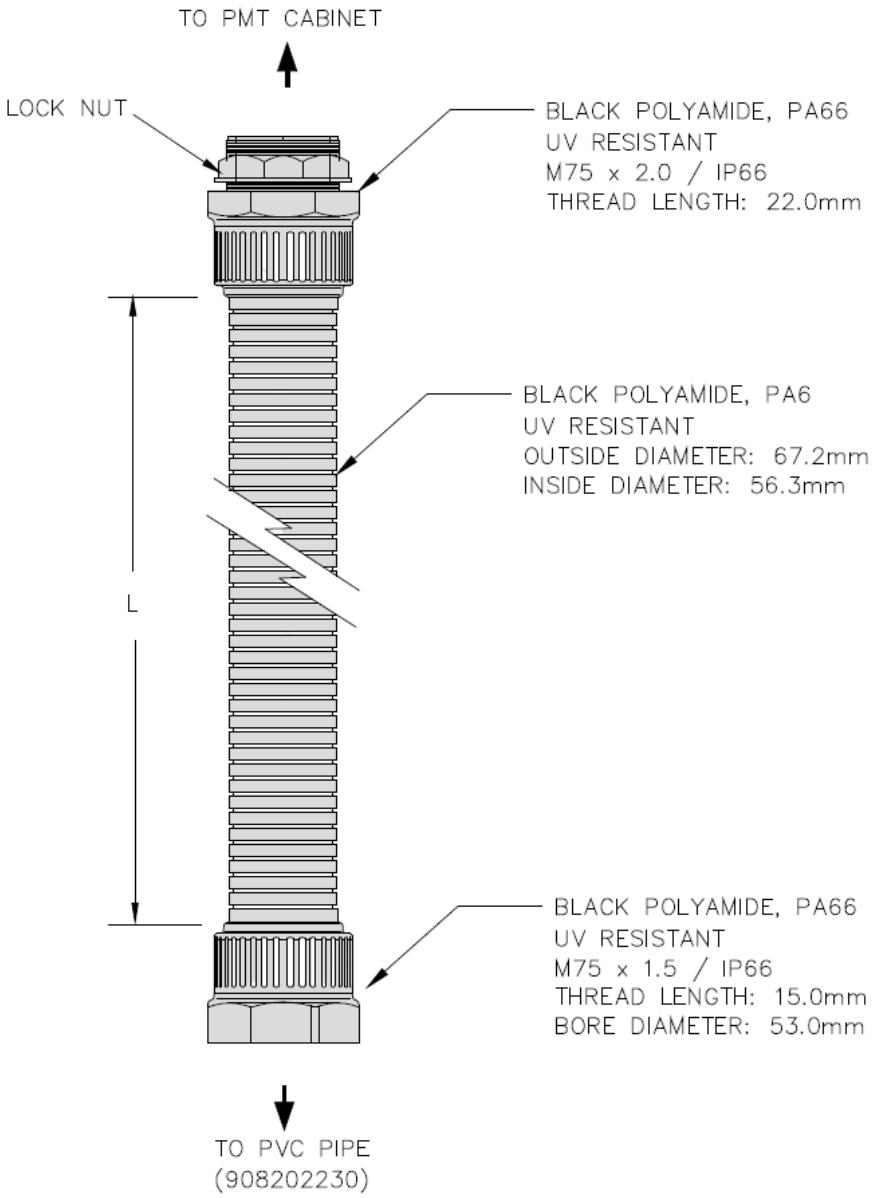


FIG. 62: PRE-ASSEMBLED FLEXIBLE CONDUIT FOR 76 mm OUTER DIAMETER SERVICE STEEL PIPE WITH LOCK NUT AND CLAMP (908202104)



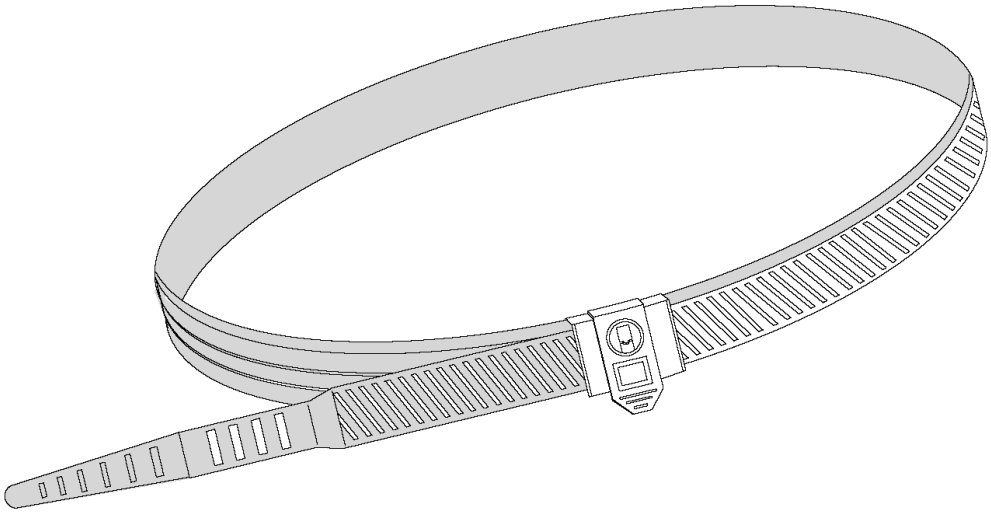
LENGTH, METERS	SIZE OF INCOMING CABLE	SEC ITEM CODE
2	4 x 300 mm²	908202233
4	4 x 185 mm²	908202232

FIG. 62A: PRE-ASSEMBLED FLEXIBLE CONDUIT WITH MALE COUPLINGS (FROM PMT CABLEBOX TO POLE-MOUNTED SERVICE CABINET)



LENGTH, METERS	SIZE OF OUTGOING CABLE	SEC ITEM CODE
2.5	4 x 120 mm²	908202234
1.0	4 x 120 mm²	908202231

FIG. 62B: PRE-ASSEMBLED FLEXIBLE CONDUIT 76 mm OUTSIDE DIAMETER PVC/PE PIPE FOR PMT STRUCTURE (H & SINGLE POLE STRUCTURE)



DIAMETER RANGE = 40MM TO 230MM
BREAKING LOAD = 535 N
WIDTH = 7.8MM
POLYMIDE OR NYLON MATERIALS
SERVICE TEMP. = −18°C TO 93°C

FIG. 63: CABLE TIES (908202070), BLACK COLOR