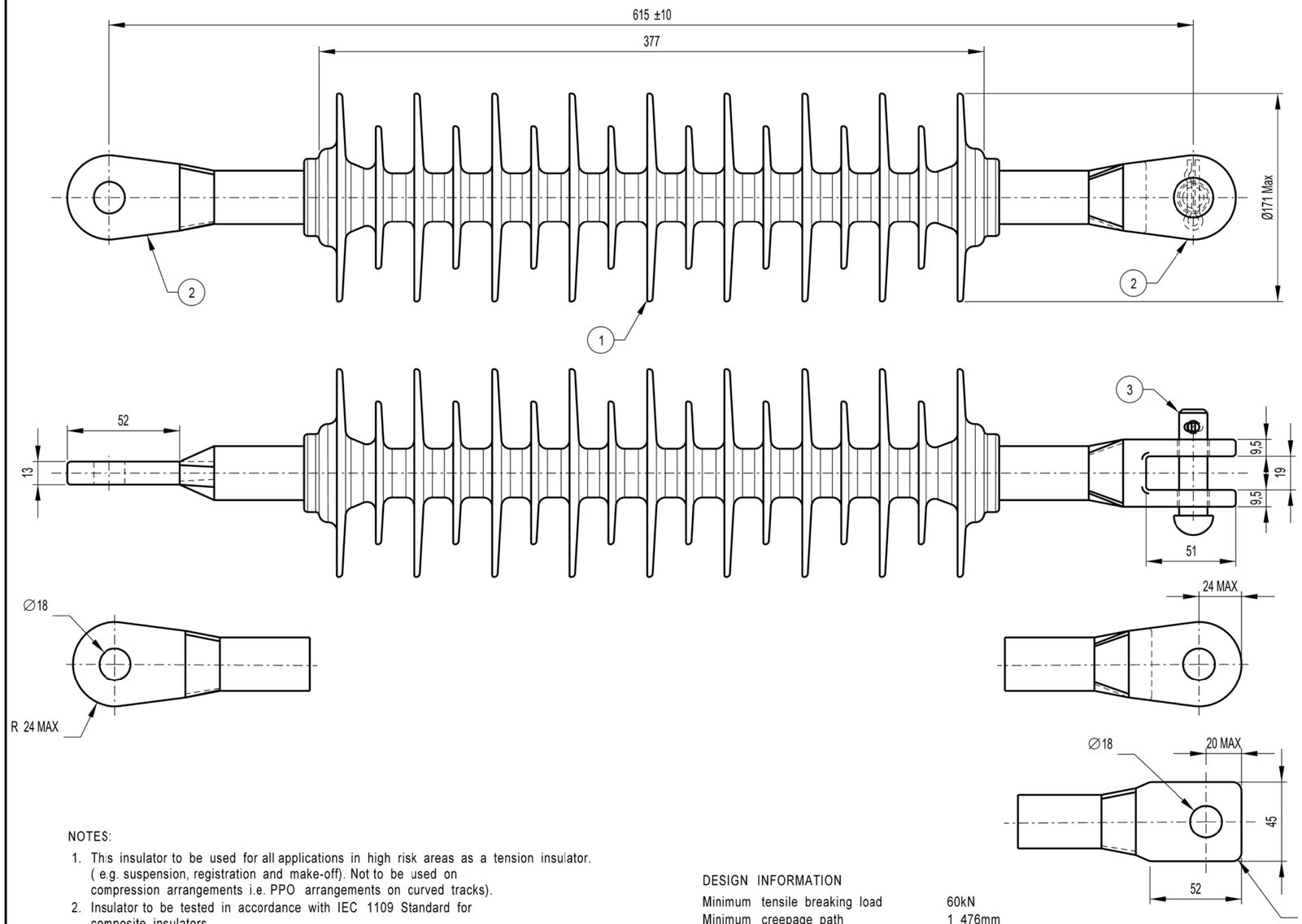
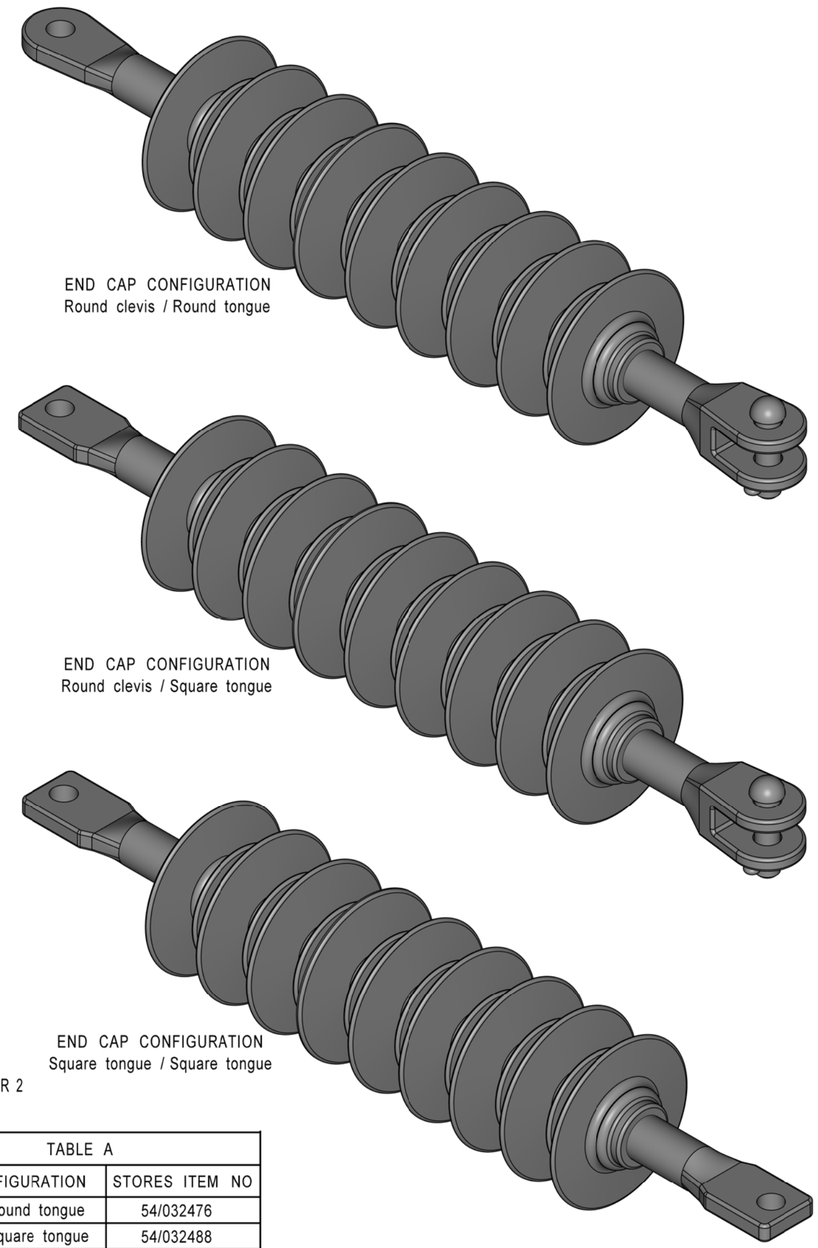
ANNEXURE B: DRAWINGS





END CAP CONFIGURATION
Round clevis / Round tongue

END CAP CONFIGURATION
Round clevis / Square tongue

END CAP CONFIGURATION
Square tongue / Square tongue

NOTES:

1. This insulator to be used for all applications in high risk areas as a tension insulator. (e.g. suspension, registration and make-off). Not to be used on compression arrangements i.e. PPO arrangements on curved tracks).
2. Insulator to be tested in accordance with IEC 1109 Standard for composite insulators.
3. Vandal proof properties of insulator to be equal or better than the "Rodurflex" traction insulators.
4. This is a typical drg only (detail shed and end fittings design to suit application).
5. End fittings to be hot dipped galvanised to SANS 121.
6. Insulator must be completely sealed for outdoor use.
7. The following permanent markings must appear on the insulator;
   a) Manufacturers Name or Logo.
   b) Dated Batch number.
   c) Specified mechanical load.

DESIGN INFORMATION

Minimum tensile breaking load	60kN
Minimum creepage path	1 476mm
Minimum arcing distance	420mm
Lightning impulse withstand voltage	250kV
Withstand alternating voltage under rain	95kV

TABLE A

END CAP CONFIGURATION	STORES ITEM NO
Round clevis / Round tongue	54/032476
Round clevis / Square tongue	54/032488
Square tongue / Square tongue	54/032605

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	Clevis pin Ø16 x 60 long complete with locking split pin.	1	54004020	CEE-TX-0066
2	End fittings: HDG spheroidal graphite iron to spec SANS 936 grade SG 50	As required	-	-
1	Insulator: Ultra violet resistant, water repellant, synthetic rubber insulation e.g. silicon rubber	As required	-	-

DIMENSIONS : mm
TOLERANCE : LIN ± 1 ANG ± -
MATERIAL : -
VERSION INFO : Redrawn and updated
SCALE : 1 : 2
ITEM NO: See table A

DO REF : CDO/ E0471
ECP REF : -
DRAWN : D Hattingh
DESIGNED : -
CHECKED : -

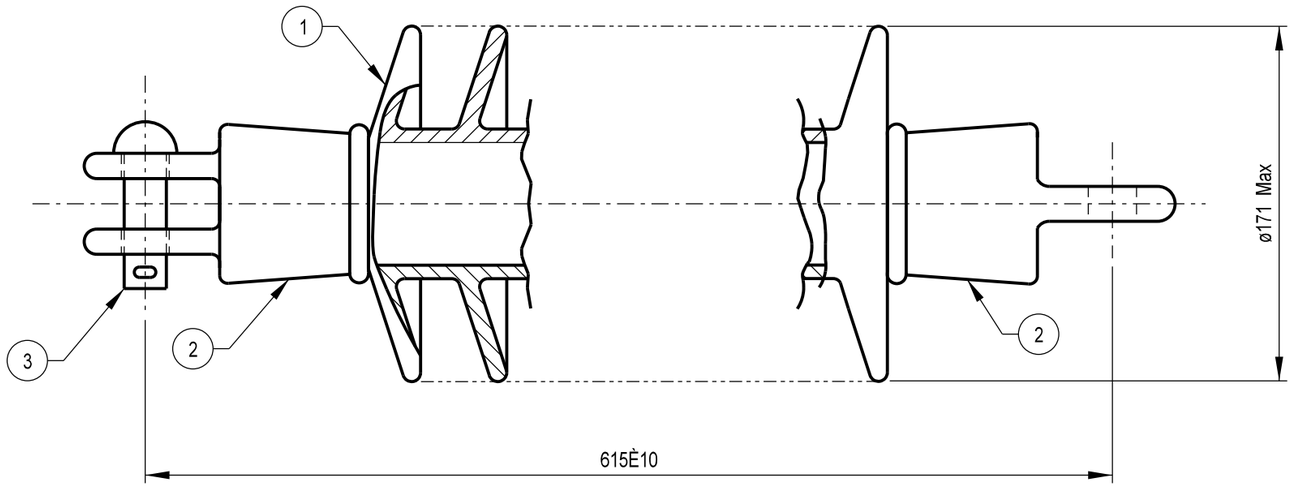
28/2/2024
APPROVED W Schoeman
AUTHORISED T Govender

VANDAL PROOF TENSION INSULATOR (COMPOSITE)
25kV AC ; TONGUE AND CLEVIS

TRANSNET
freight rail

BBB0281
VERSION 6

A2



DESIGN INFORMATION

Minimum tensile breaking load	22.24kN
Minimum tensile working load	8.89kN
Compression load	23.5kN
Minimum bending load	2kNm
Minimum creepage path	1 476mm
Minimum arcing distance	420mm (Min)
Lightning impulse withstand voltage	250kV
Withstand alternating voltage under rain	95kV

NOTES:
1. This insulator to be used for all applications in high risk areas (e.g. PPO arrangements on curved tracks).
2. Insulator to be tested in accordance with IEC 1109 Standard for composite insulators.
3. Vandal proof properties of insulator to be equal or better than the "Rodurflex" traction insulators.
4. This is a typical drg only (detail shed and end fittings design to suit application).
5. Total length from end of pipe fitting to hole centre 775±10.

TABLE A (SEE DRG NO BBB0430)

END CAP CONFIGURATION	STORES ITEM NO
Round tongue / Pipe fitting	54/032516
Square tongue / Pipe fitting	54/032528
Square tongue / Clevis	54/032541
Clevis / Pipe fitting	54/032553
Square tongue / Square tongue	54/032617

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	Clevis pin with locking split pin, ø16	1	54/004020	CEE-TX-66
2	End fittings: Corrosion resistant e.g. Al alloy, bronze or galv steel or holes with galv steel or stainless steel inserts (See table A)	As required	-	BBB0430
1	Insulator: Ultra violet resistant, water repellant, synthetic rubber insulation e.g. silicon rubber	As required	-	-

DIMENSIONS : mm SCALE : NTS
TOLERANCE : LINÈ 1 ANGÈ ITEM NO: See table A
MATERIAL : -
VERSION INFO: Note 5 added.

+ 28/02/2024
APPROVED : W Schoeman

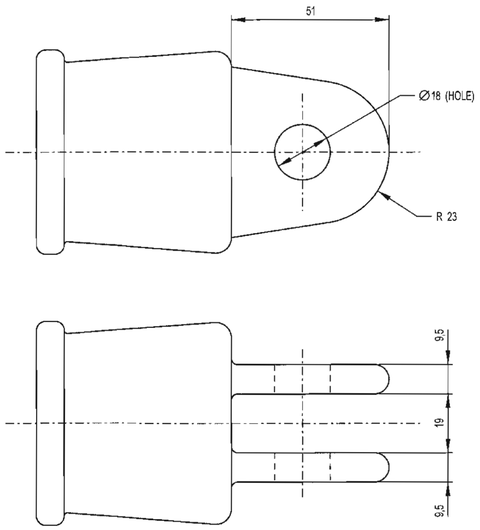
+ T Govender
AUTHORISED : T Govender

VANDAL PROOF COMPRESSION INSULATOR (COMPOSITE) 25kV AC

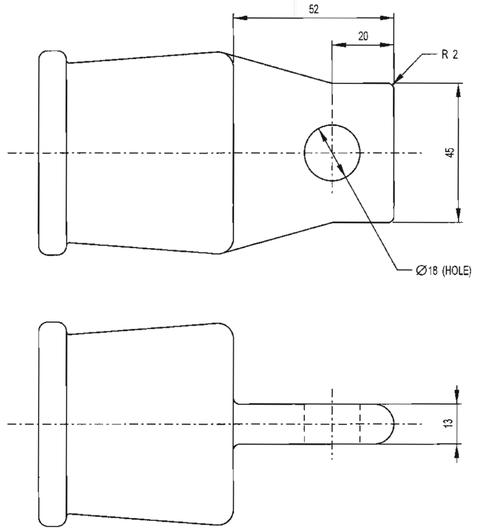
TRANSNET freight rail

BBB0429
VERSION 5
A3

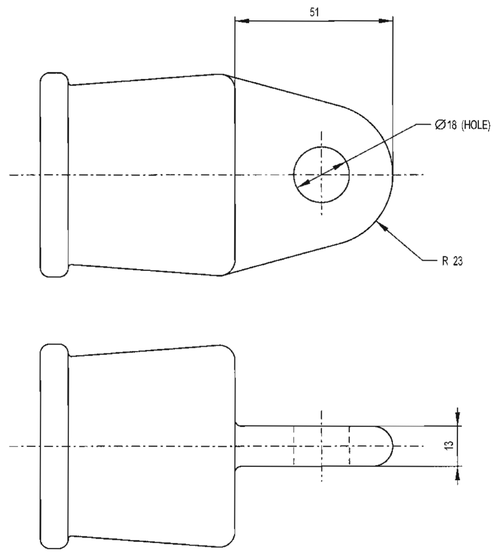
DO REF: CDO/E0471 ECP REF:BBD6240 DRAWN: D Hattingh DESIGNED: - CHECKED: D Hattingh



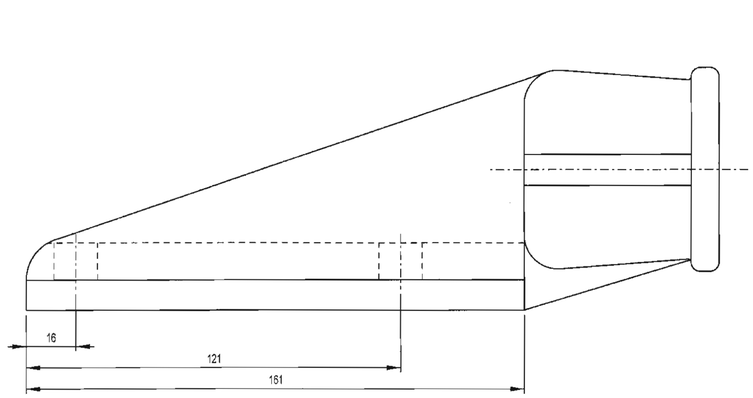
CLEVIS

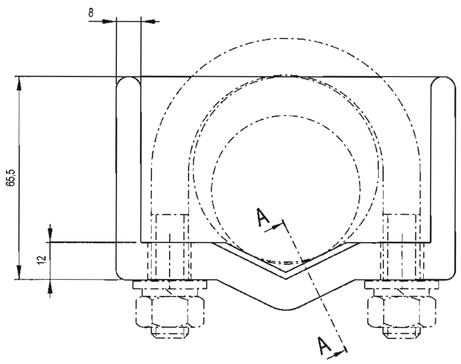


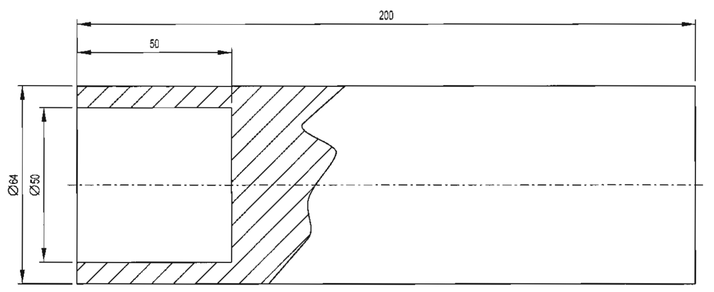
SQUARE TONGUE



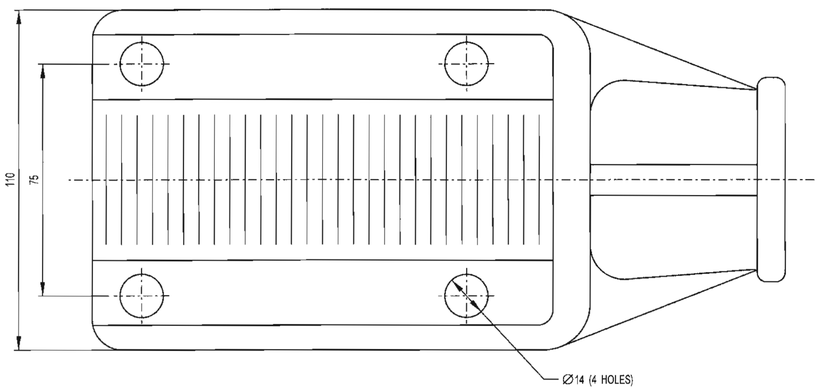
ROUND TONGUE



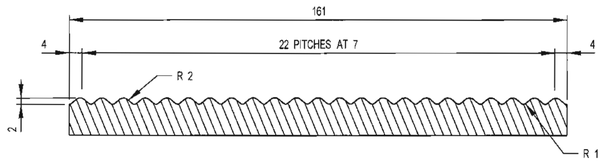




TUBE FITTING



PIPE FITTING



SECTION A-A

NOTES

1. Internal and external dimensions of cap to suit insulator requirements and to be left to the manufacturer.
2. The following permanent markings must appear on final product:
   A). Manufacturers logo.
   B). Dated batch number.
   C). Specified mechanical load.
3. Finish: Hot dip galvanise to Spec SANS 121.
4. End caps to be sealed against ingress of water to insulator.

DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN ± 1	ANG ±	ITEM NO : -
MATERIAL	: Spheroidal graphite iron to Spec. SANS 936 grade SG 50		
VERSION INFO	: Updated and revised notes		

DO REF	: CDO/ 9267
ECP REF	: -
DRAWN	: D.A. Ballabio
DESIGNED	: -
CHECKED	: -

+ 2018/11/30 APPROVED S. Smit

+ 2018/11/30 AUTHORISED L.Borchard

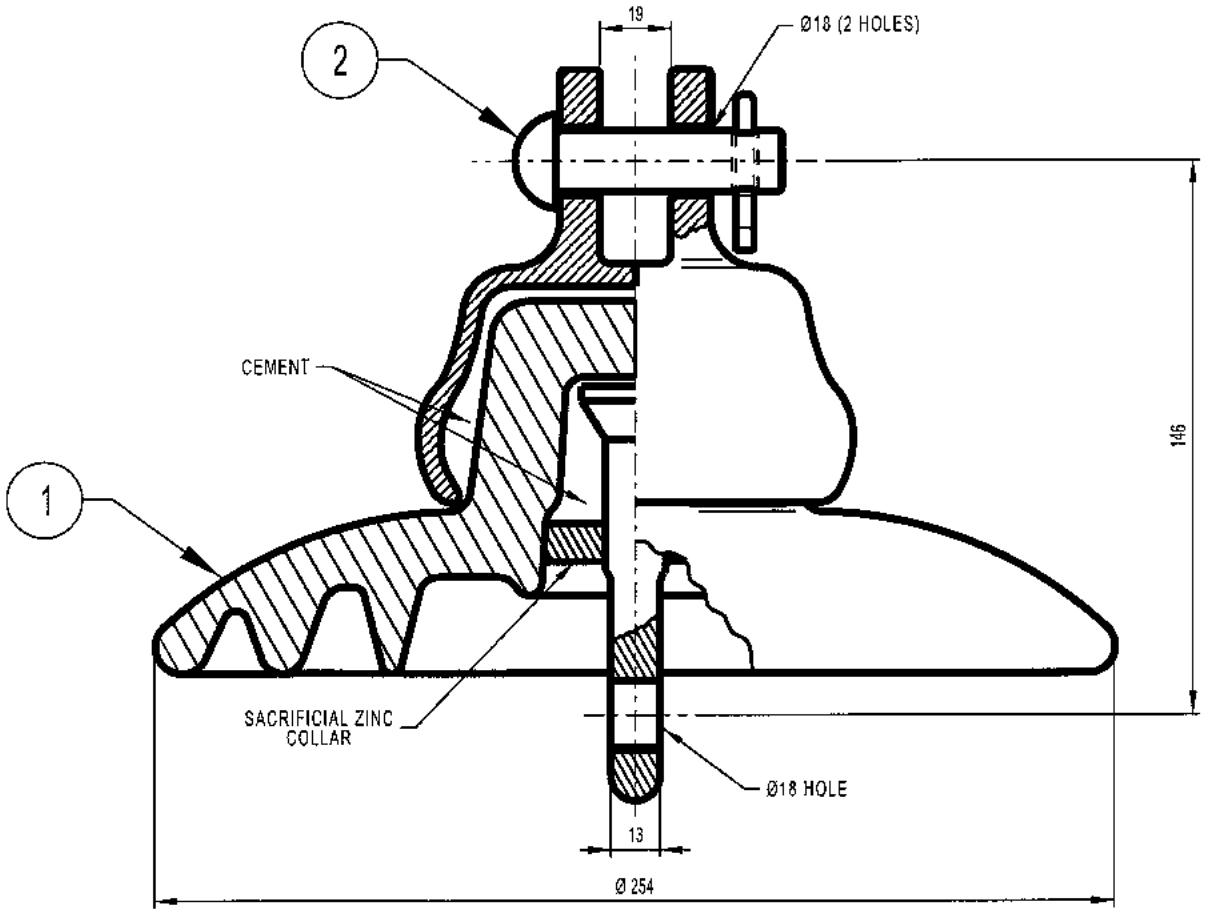
CLEVIS, TONGUE AND PIPE END FITTINGS FOR COMPOSITE VANDAL PROOF COMPRESSION INSULATORS 3kV DC AND 25kV AC

TRANSNET freight rail

BBB0430

VERSION 4

A1



TECHNICAL PARAMETERS	
DRY FLASHOVER VOLTAGE	75kV
WET FLASHOVER VOLTAGE	50kV
DRY WITHSTAND VOLTAGE (Min.)	70kV
WET WITHSTAND VOLTAGE (Min.)	45kV
50% IMPULSE FLASHOVER VOLTAGE (Pos.)	130kV
50% IMPULSE FLASHOVER VOLTAGE (Neg.)	140kV
PUNCTURE TEST WITHSTAND VOLTAGE (Min.)	110kV
MECHANICAL STRENGTH (Min.)	70kN
LEAKAGE DISTANCE	280mm
PROTECTED LEAKAGE DISTANCE	200mm

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	CLEVIS PIN	1	54004020	CEE-TX-0066
1	DISC INSULATOR, CERAMIC / GLASS TYPE U70/CL WITH ZINC COLLAR	1	-	-

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN± 0,5 ANG±1° ITEM NO : 54001177
MATERIAL : -

VERSION INFO : NEW FRAME ADDED.

2019-09-18
APPROVED: S SMIT

2019-09-18
AUTHORISED: L O BORCHARD

SUSPENSION INSULATOR CLEVIS & TONGUE. 11kV TRANSMISSION LINE

TRANSNET freight rail

BBB1158
VERSION 2
A4

DO REF: CDO/ 9424 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

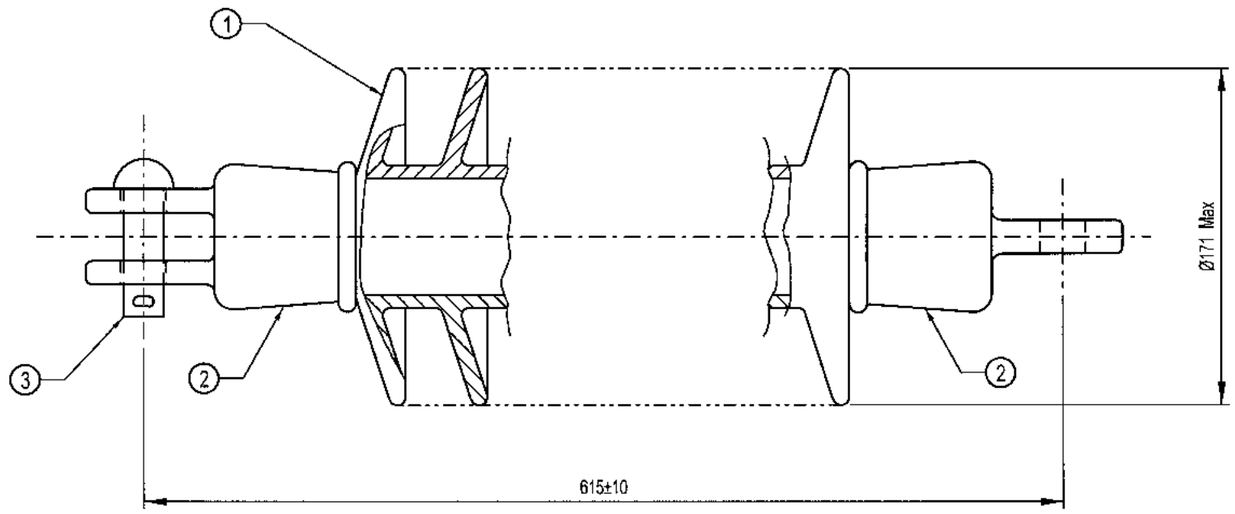


TABLE A (SEE DRG NO BBB3020)	
END CAP CONFIGURATION	**STORES ITEM NO**
ROUND TONGUE / PIPE FITTING	54033381
HOOK TONGUE / PIPE END FITTING	54033408
ROUND TONGUE / ROUND TONGUE	54033393
ROUND TONGUE / HOOK TONGUE	54024239
PIPE FITTING / PIPE FITTING	54034022

DESIGN INFORMATION

MINIMUM TENSILE BREAKING LOAD	22.24kN
MINIMUM TENSILE WORKING LOAD	8.89kN
COMPRESSION LOAD	23.5kN
MINIMUM BENDING LOAD	2kNm
MINIMUM CREEPAGE PATH	1 476mm
MINIMUM ARCING DISTANCE	420mm (Min)
LIGHTNING IMPULSE WITHSTAND VOLTAGE	250kV
WITHSTAND ALTERNATING VOLTAGE UNDER RAIN	95kV

NOTES

1. THIS INSULATOR TO BE USED FOR ALL APPLICATIONS IN HIGH RISK AREAS (e.g. PPO ARRANGEMENTS ON CURVED TRACKS).
2. INSULATOR TO BE TESTED IN ACCORDANCE WITH IEC 1109 STANDARD FOR COMPOSITE INSULATORS.
3. VANDAL PROOF PROPERTIES OF INSULATOR TO BE EQUAL OR BETTER THAN THE "RODURFLEX" TRACTION INSULATORS.
4. THIS IS A TYPICAL DRG ONLY (DETAIL SHED AND END FITTINGS DESIGN TO SUIT APPLICATION).
5. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURER'S IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) SPECIFIED MECHANICAL LOAD.

* AS REQUIRED

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	CLEVIS PIN WITH LOCKING SPLIT PIN, Ø16	1	54/004020	CEE-TX-66
2	END FITTINGS: CORROSION RESISTANT e.g. Al ALLOY, BRONZE OR GALVANISED STEEL OR HOLES WITH GALVANISED STEEL OR STAINLESS STEEL INSERTS (SEE TABLE A)	*	-	BBB3020
1	INSULATOR: ULTRA VIOLET RESISTANT, WATER REPELLANT, SYNTHETIC RUBBER INSULATION e.g. SILICON RUBBER	*	-	-

DIMENSIONS : mm
TOLERANCE : LIN± - ANG± -
MATERIAL : -
VERSION INFO : NOTE 5 ADDED.

SCALE : NTS
ITEM NO : -

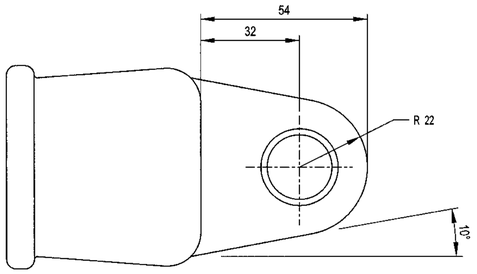
+ 2019-10-08
APPROVED: S SMIT

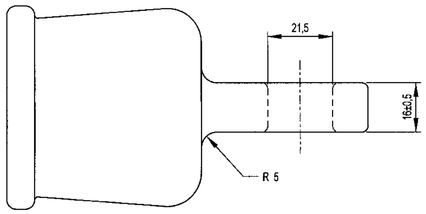
+ 2019-10-08
AUTHORISED: L O BORCHARD

EAST LONDON
VANDAL PROOF COMPRESSION INSULATOR (COMPOSITE)
25kV AC

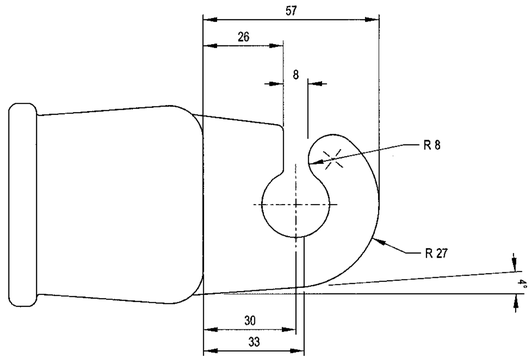
TRANSNET freight rail
BBB3019
VERSION 5
A3

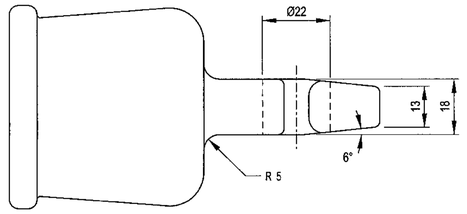
DO REF: CDO/ 9424 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH



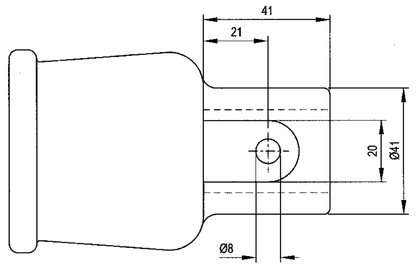


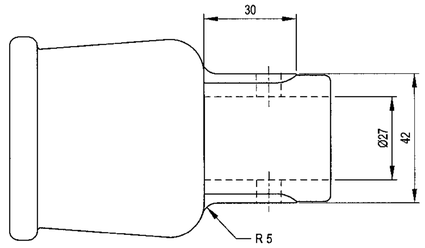
ROUND TONGUE



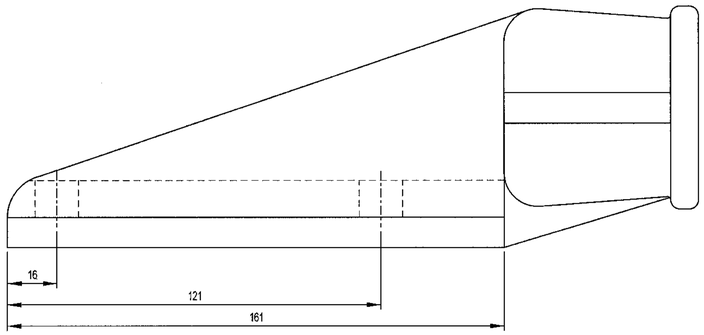


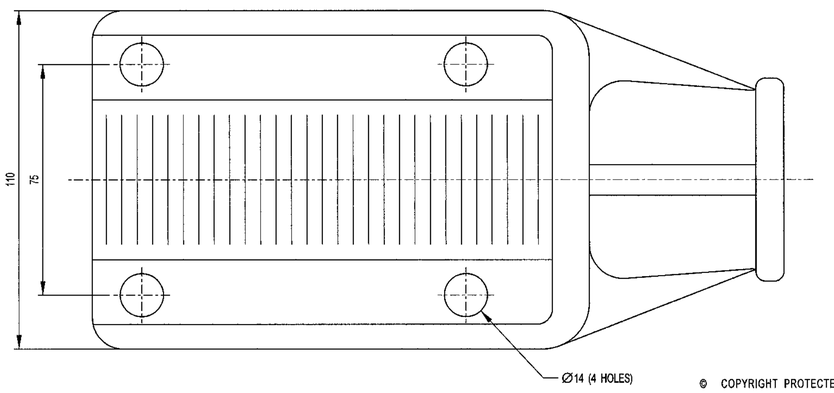
HOOK TONGUE



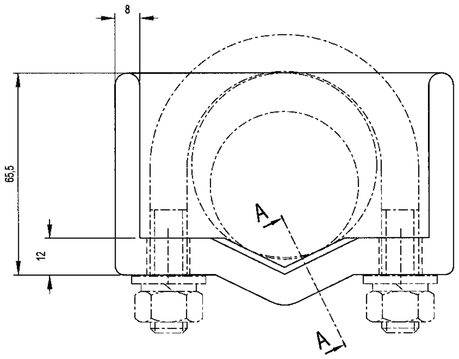


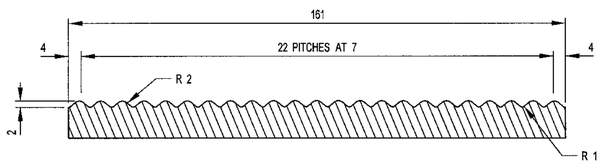
PIPE END FITTING





PIPE FITTING





SECTION A-A

NOTES
1. INTERNAL AND EXTERNAL DIMENSIONS OF CAP TO SUIT INSULATOR REQUIREMENTS AND TO BE LEFT TO THE MANUFACTURER.
2. FINISH: HOT DIP GALVANISE TO SANS 121.
3. FOR USE WITH COMPOSITE COMPRESSION INSULATOR; SEE DRG NO BBB3019.
4. END CAPS TO BE SEALED AGAINST INGRESS OF WATER TO INSULATOR.
5. ALL UNSPECIFIED RADII R2.

DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN ± 1 ANG ± 1°	ITEM NO	: -
MATERIAL	: SPHEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50		
VERSION INFO	: NOTES AMENDED		

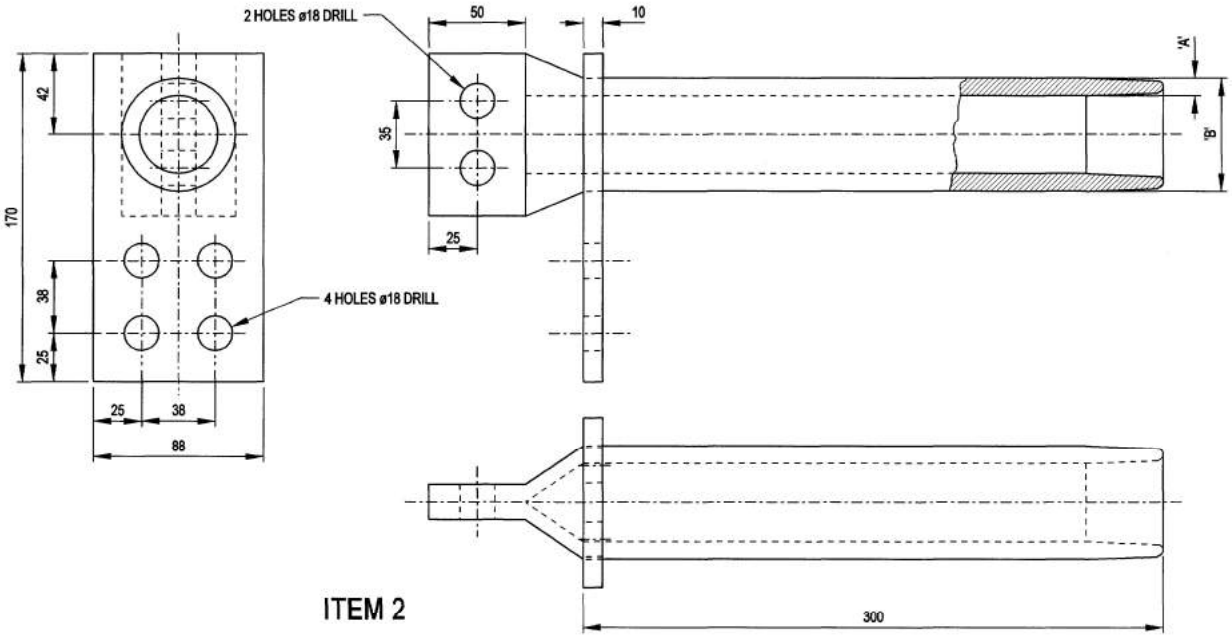
DO REF	: CDO/9424
ECP REF	: -
DRAWN	: D HATTINGH
DESIGNED	: -
CHECKED	: D HATTINGH

+ 2019-10-08
APPROVED: S SMIT
+ 2019-10-08
AUTHORISED: L O BORCHARD

EAST LONDON
TONGUE AND PIPE FITTINGS FOR COMPOSITE VANDAL PROOF COMPRESSION INSULATOR. 25kV AC

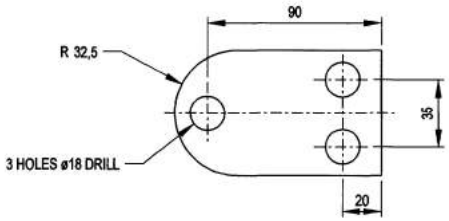
TRANSNET freight rail

BBB3020
VERSION 2
A1

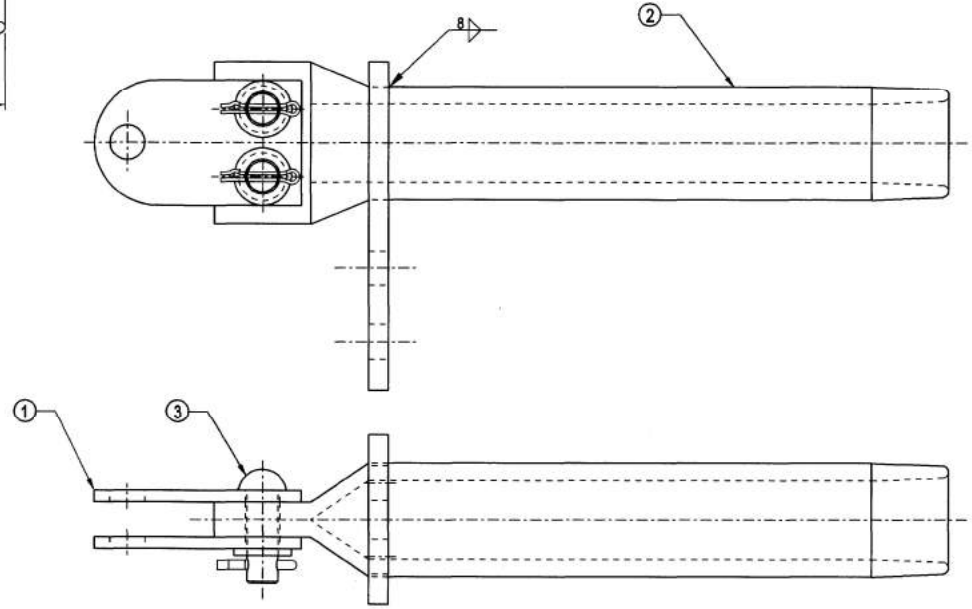


ITEM 2

CONDUCTOR	"DEER" (NOTE 5)	"LAPWING" (NOTE 5)
DIMENSION 'A'	10,72 ± 0,45	9,1 ± 0,45
DIMENSION 'B'	53,98 ± 0,2	58,72 ± 0,2
INNER SPLICE	DRG NO BBB3596 (NOTE 5)	DRG NO BBB3597 (NOTE 5)
STORES ITEM NO	54/33445	54/33457



ITEM 1



ASSEMBLY

NOTES
1. FOR TENSION SPLICE OR CRIMP LENGTH SEE DRG NO CEE-TNB-29.
2. ITEMS 1 & 3 ZINC COAT TO SANS 121.
3. TO BE READ IN CONJUNCTION WITH SPECIFICATION CEE.0036.
4. FOR ARRANGEMENT DETAIL SEE DRG NO BBB3590.
5. EACH SPLICE MUST BE ACCOMPANIED BY THE APPROPRIATE INNER SPLICE.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	PIN, STRAIGHT, HEADED, ø16 x 60L (SEE NOTE 2)	2	-	CEE-TX-66
2	CLAMP (SEE NOTE 3)	1	-	-
1	STEEL, FLAT 65 x 6 x 107L (SEE NOTE 2)	2	-	-

DIMENSIONS : mm
TOLERANCE : LIN ± 0,5 ANG ± -
MATERIAL : -
VERSION INFO : -
SCALE : 1 : 2
ITEM NO : -

DO REF : CDO/2357
ECP REF : -
DRAWN : JR Anthony
DESIGNED : -
CHECKED : JD van Dyk

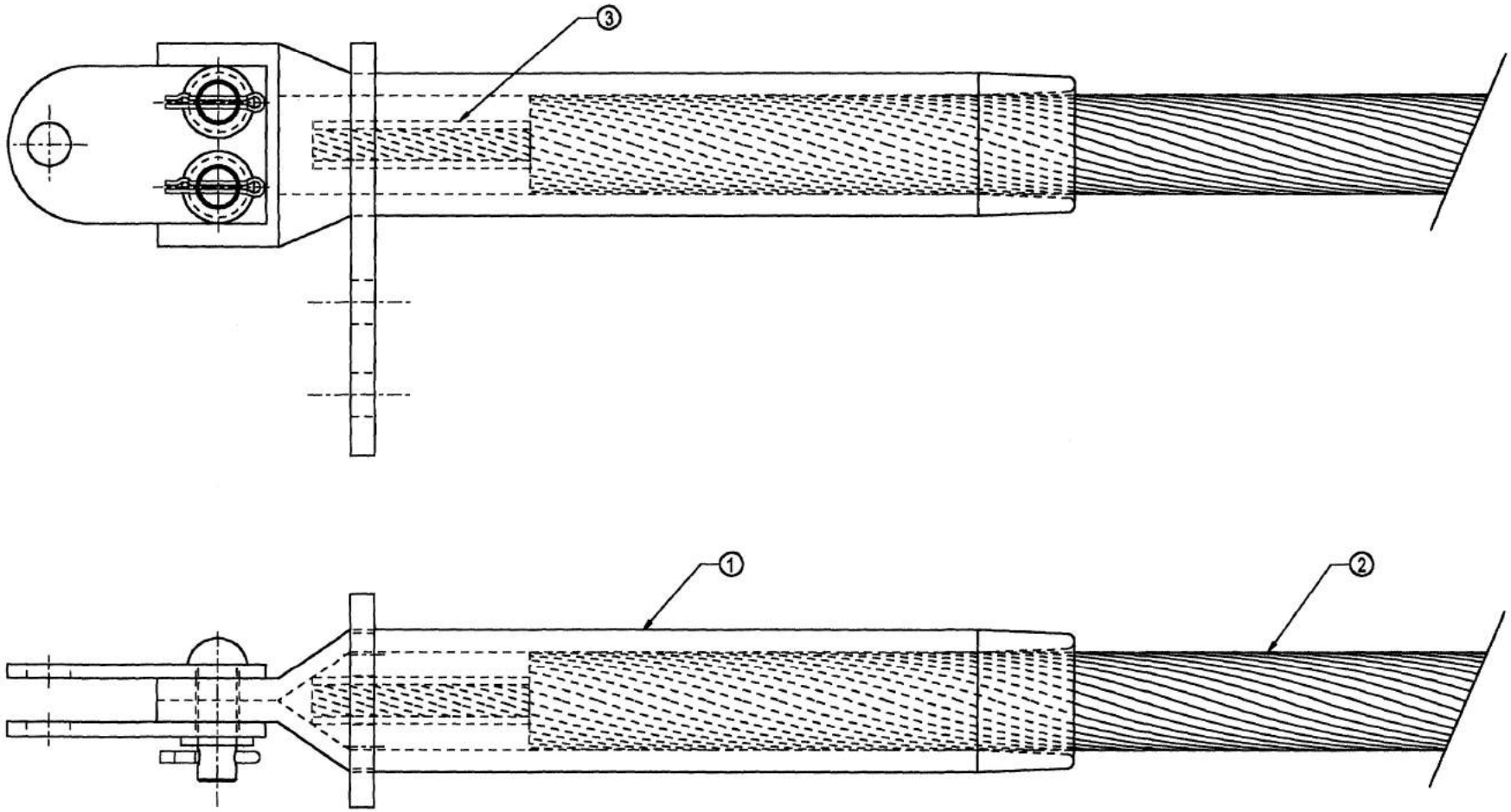
DATE: 12/2/2003
APPROVED
AUTHORISED

CENTRAL DRAWING OFFICE

STRAIN CLAMP ASSEMBLY "DEER" AND "LAPWING" ACSR FEEDER CONDUCTORS

SPOORNET

BBB3589
VERSION 1
A2



NOTE
MINIMUM OF 4 (FOUR) CRIMPS (EACH CRIMP = 50mm WIDE) ON ITEM 1.
APPLY MAXIMUM NUMBER OF CRIMPS ON ITEM 3.

ITEM NO	DESCRIPTION		QTY	STORES ITEM NO	DRAWING NO
3	STEEL INNER SPLICE	"DEER"	1	-	BBB3596
		"LAPWING"	1	-	BBB3597
2	ACSR CONDUCTOR ("DEER" OR "LAPWING")		-	-	-
1	STRAIN CLAMP ASSEMBLY		1	-	BBB3589

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN± - ANG± - ITEM NO : -
MATERIAL : -
VERSION INFO : -

DO REF : CDO/2357
ECP REF : -
DRAWN : JR Anthony
DESIGNED : -
CHECKED : JD van Dyk

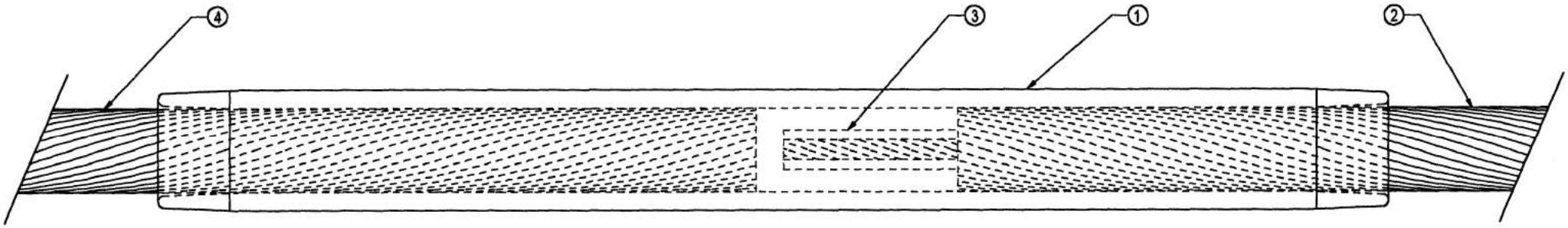
DATE: 12/2/2003
APPROVED
AUTHORISED

CENTRAL DRAWING OFFICE

DEAD- END STRAIN CLAMP ARRANGEMENT "DEER" OR "LAPWING" ACSR CONDUCTORS

SPOORNET

BBB3590
VERSION 1
A3



NOTE
MINIMUM OF 4 (FOUR) CRIMPS PER SIDE (EACH CRIMP = 50mm WIDE) ON ITEM 1.
APPLY MAXIMUM NUMBER OF CRIMPS ON ITEM 3.

ITEM NO	DESCRIPTION		QTY	STORES ITEM NO	DRAWING NO
4	500mm² AAC "SCORPION" OR 800mm² AAC "BULL" CONDUCTOR		-	-	-
3	STEEL INNER SPLICE	"DEER"	1	-	BBB3596
		"LAPWING"	1	-	BBB3597
2	ACSR CONDUCTOR ("DEER" OR "LAPWING")		-	-	-
1	ALUMINIUM TENSION SPLICE		1	-	BBB3593

DIMENSIONS : mm
TOLERANCE : LIN± - ANG± -
MATERIAL : -
VERSION INFO : -
SCALE : 1 : 2
ITEM NO : -

DO REF : CDO/2357
ECP REF : -
DRAWN : JR Anthony
DESIGNED : -
CHECKED : JD van Dyk

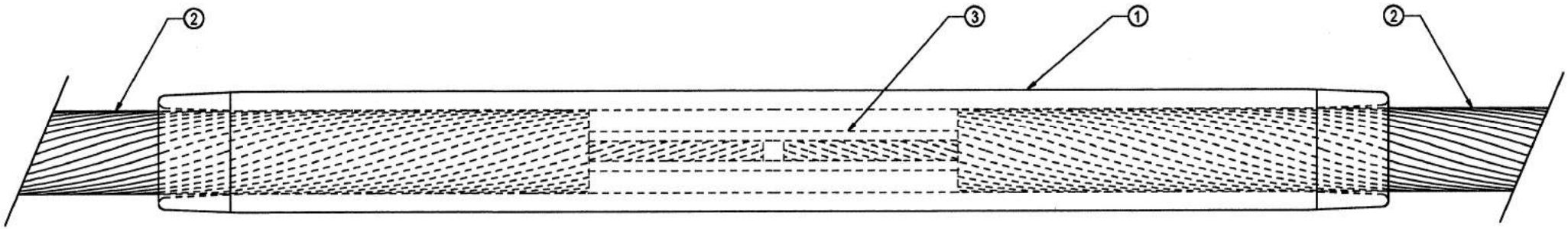
DATE: 12/2/2003
APPROVED
AUTHORISED

CENTRAL DRAWING OFFICE

MID- SPAN TENSION SPLICE ARRANGEMENT AAC 500mm² "SCORPION" WITH "DEER" ACSR OR AAC 800mm² "BULL" WITH "LAPWING" ACSR

SPOORNET

BBB3591
VERSION 1
A3



NOTE
MINIMUM OF 4 (FOUR) CRIMPS PER SIDE (EACH CRIMP = 50mm WIDE) ON ITEM 1.
APPLY MAXIMUM NUMBER OF CRIMPS ON ITEM 3.

ITEM NO	DESCRIPTION		QTY	STORES ITEM NO	DRAWING NO
3	STEEL INNER SPLICE	"DEER"	1	-	BBB3594
		"LAPWING"	1	-	BBB3595
2	ACSR CONDUCTOR ("DEER" OR "LAPWING")		-	-	-
1	ALUMINIUM TENSION SPLICE		1	-	BBB3593

DIMENSIONS : mm
TOLERANCE : LIN± - ANG± -
MATERIAL : -
VERSION INFO : -
SCALE : 1 : 2
ITEM NO : -

DO REF : CDO/2357
ECP REF : -
DRAWN : JR Anthony
DESIGNED : -
CHECKED : JD van Dyk

DATE: 12/2/2003
APPROVED
AUTHORISED

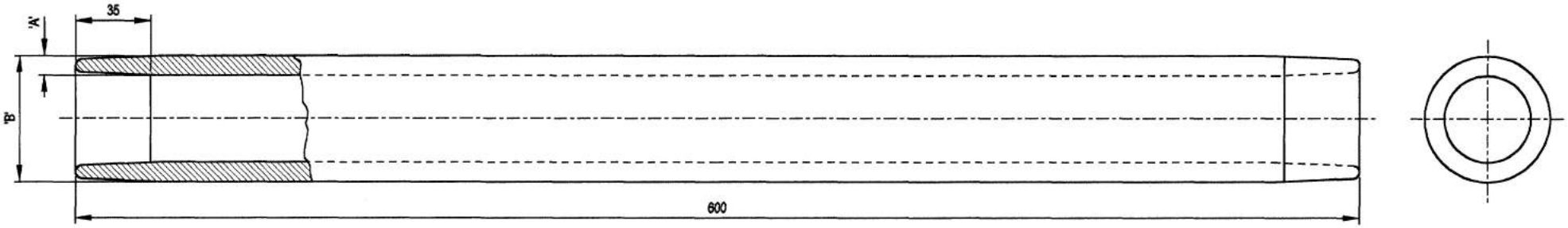
CENTRAL DRAWING OFFICE

MID- SPAN TENSION SPLICE ARRANGEMENT ACSR CONDUCTORS "DEER" WITH "DEER" OR "LAPWING" WITH "LAPWING"

SPOORNET

BBB3592
VERSION 1
A3

CONDUCTOR	"DEER" TO "DEER" (NOTE 3)	"LAPWING" TO "LAPWING" (NOTE 3)	"DEER" TO 500mm² AAC (NOTE 3)	"LAPWING" TO 800mm² AAC (NOTE 3)
DIMENSION 'A'	10,72 ± 0,45	9,1 ± 0,45	10,72 ± 0,45	9,1 ± 0,45
DIMENSION 'B'	53,98 ± 0,2	58,72 ± 0,2	53,98 ± 0,2	58,72 ± 0,2
INNER SPLICE	DRG NO BBB3594 (NOTE 3)	DRG NO BBB3595 (NOTE 3)	DRG NO BBB3596 (NOTE 3)	DRG NO BBB3597 (NOTE 3)
STORES ITEM NO	54/33469	54/33470	54/33482	54/33494



NOTES
1. FOR ARRANGEMENT DETAIL OF "DEER" TO "DEER" OR "LAPWING" TO "LAPWING" SEE DRG NO BBB3592.
2. FOR ARRANGEMENT DETAIL OF 500mm² OR 800mm² AAC TO "DEER" OR "LAPWING" ACSR SEE DRG NO BBB3591.
3. EACH SPLICE KIT MUST BE ACCOMPANIED BY THE APPROPRIATE INNER SPLICE.
4. FOR TENSION SPLICE OR CRIMP LENGTH SEE DRG NO CEE-TNB-29.

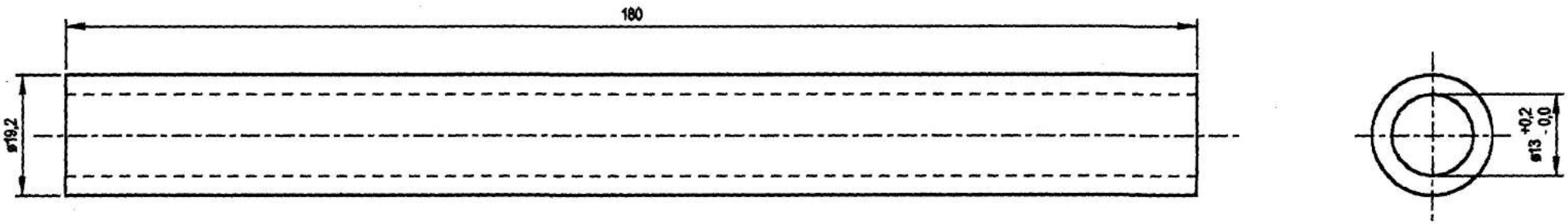
DIMENSIONS : mm	SCALE : 1 : 2	DO REF : CDO/2357	DATE: 12/2/2003
TOLERANCE : LIN± 0,5 ANG± -	ITEM NO : -	ECP REF : -	APPROVED
MATERIAL : ALUMINIUM TO SPEC CEE.0038.		DRAWN : JR Anthony	AUTHORISED
VERSION INFO : -		DESIGNED : -	
		CHECKED : JD van Dyk	

CENTRAL DRAWING OFFICE

TENSION SPLICE (600mm LONG) FOR ACSR TO ACSR OR ACSR TO AAC CONDUCTORS

SPOORNET

BBB3593
VERSION 1
A3



NOTE
MINIMUM OF 3 (THREE) CRIMPS (EACH CRIMP = 25mm WIDE).

DIMENSIONS : mm	SCALE : 1 : 1	DO REF : CDO/2357	DATE: 12/2/2003
TOLERANCE : LIN ± 0,5 ANG ± -	ITEM NO : -	ECP REF : -	APPROVED
MATERIAL : STEEL, TUBE, ø19,2 O.D. AND ø13 I.D.		DRAWN : JR Anthony	AUTHORISED
VERSION INFO : -		DESIGNED : -	
		CHECKED : JD van Dyk	

CENTRAL DRAWING OFFICE

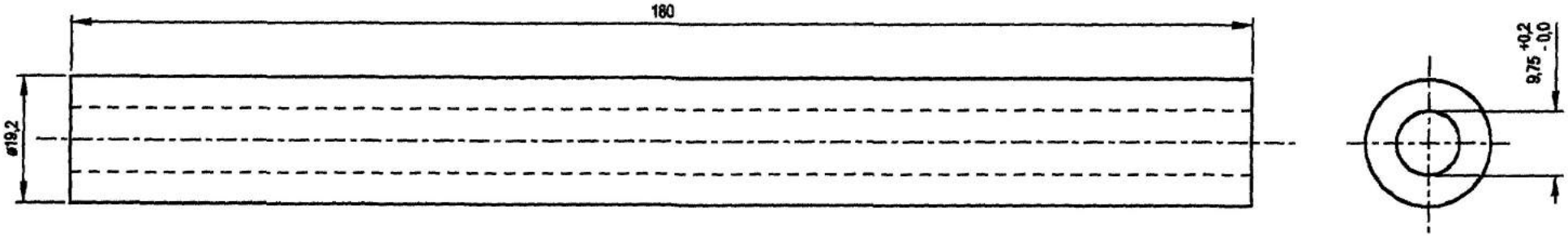
INNER SPLICE, MID- SPAN STEEL REINFORCING "DEER" ACSR CONDUCTOR

SPOORNET

BBB3594

VERSION 1

A4



NOTE
MINIMUM OF 3 (THREE) CRIMPS (EACH CRIMP = 25mm WIDE).

DIMENSIONS . mm	SCALE . 1 . 1	DO REF CDO/2357	DATE 12/2/2003
TOLERANCE · LIN ± 0,5 ANG ± -	ITEM NO · -	ECP REF -	APPROVED
MATERIAL : STEEL, TUBE, ø19,2 O D. AND ø9,75 I D.		DRAWN JR Anthony	
VERSION INFO . -		DESIGNED -	AUTHORISED
		CHECKED D van Dyk	

CENTRAL DRAWING OFFICE

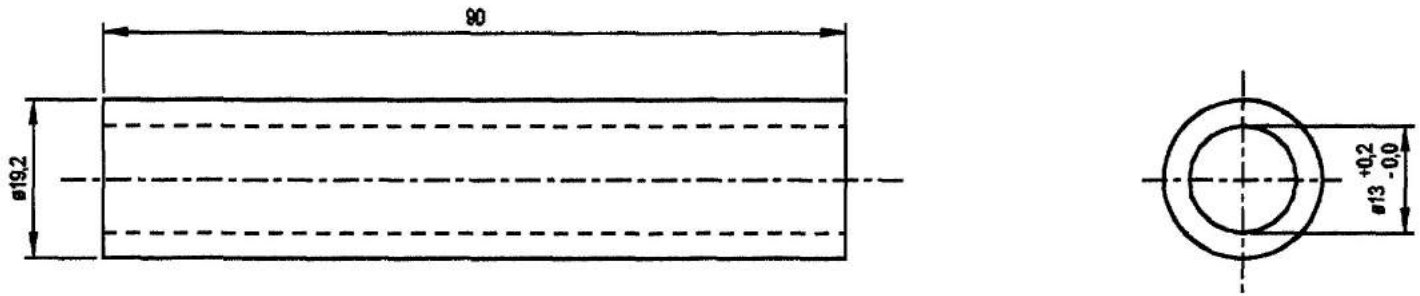
INNER SPLICE, MID- SPAN STEEL REINFORCING "LAPWING" ACSR CONDUCTOR

SPOORNET

BBB3595

VERSION 1

A4



NOTE
MINIMUM OF 3 (THREE) CRIMPS (EACH CRIMP = 25mm WIDE).

IMENSIONS : mm	SCALE : 1 : 1	
OLERANCE : LIN ± 0,5 ANG ± -	ITEM NO: -	
IATERIAL : STEEL, TUBE, ø19,2 O.D. AND ø13 I.D.		
ERSION INFO : -		

DO REF	: CDO/2357
ECP REF	: -
DRAWN	: JR Anthony
DESIGNED	: -
CHECKED	: JD van Dyk

DATE: 12/2/2003
APPROVED
AUTHORISED

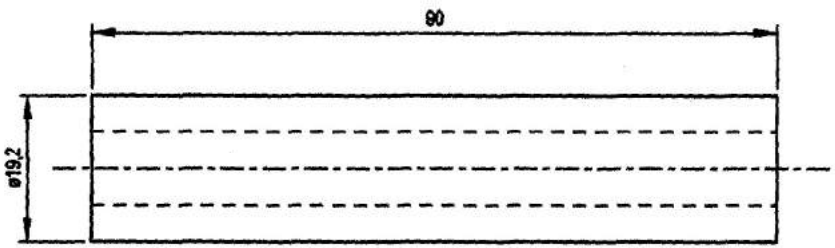
CENTRAL DRAWING OFFICE

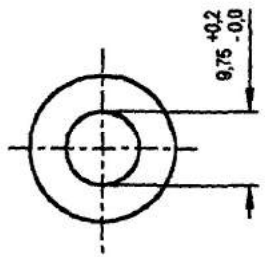
INNER SPLICE STEEL REINFORCING "DEER" ACSR CONDUCTOR

SPOORNET

BBB3596
VERSION 1

A





NOTE
MINIMUM OF 3 (THREE) CRIMPS (EACH CRIMP = 25mm WIDE).

DIMENSIONS : mm	SCALE : 1 : 1	DO REF : CDO/2357	DATE: 12/2/2003
TOLERANCE : LIN ± 0,5 ANG ± -	ITEM NO : -	ECP REF : -	APPROVED
MATERIAL : STEEL, TUBE, ø19,2 O.D. AND ø9,75 I.D.		DRAWN : JR Anthony	AUTHORISED
VERSION INFO : -		DESIGNED : -	
		CHECKED : JD van Dyk	

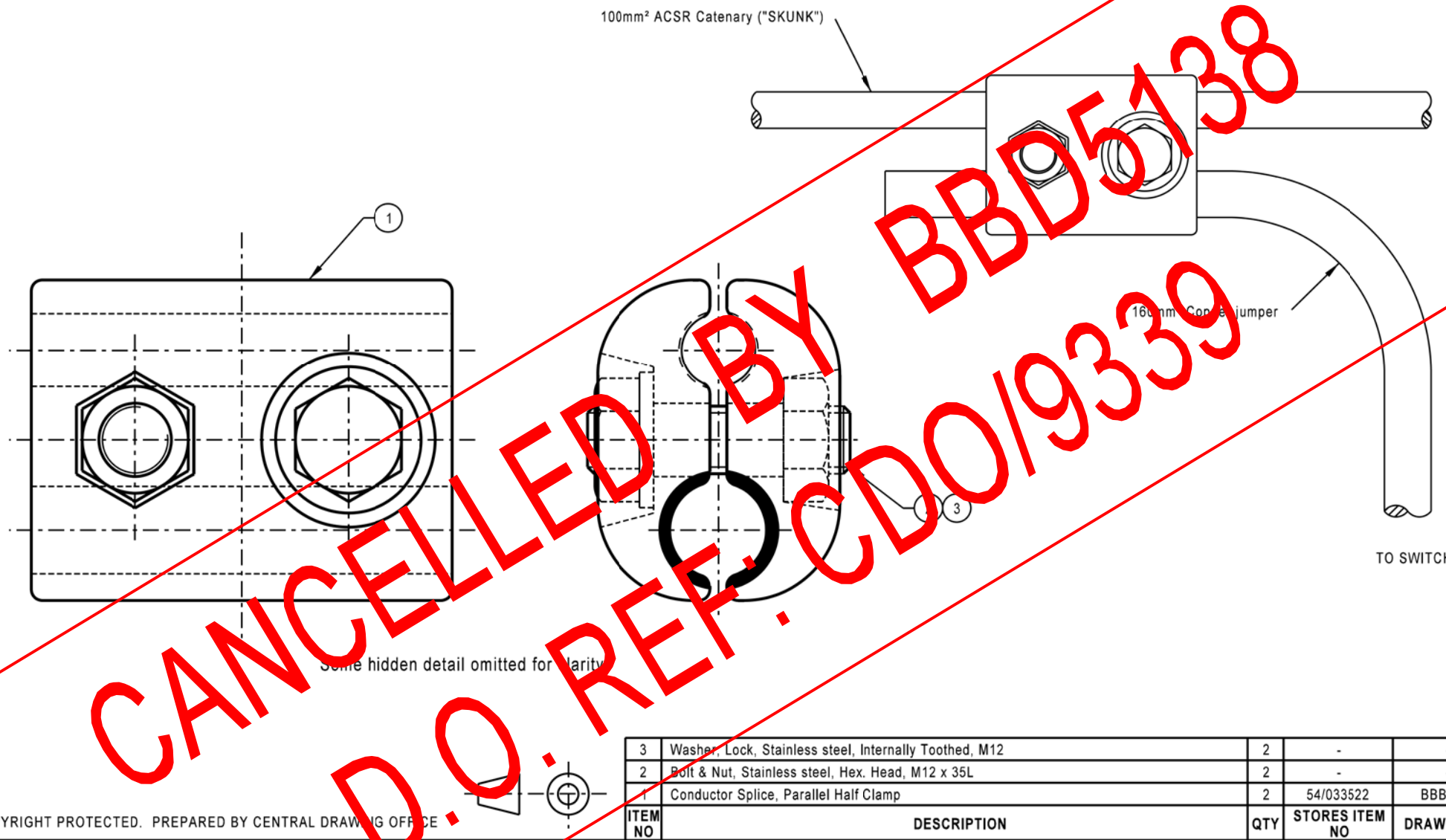
CENTRAL DRAWING OFFICE

INNER SPLICE STEEL REINFORCING "LAPWING" ACSR CONDUCTOR

SPOORNET

BBB3597
VERSION 1

A4



ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	Washer, Lock, Stainless steel, Internally Toothed, M12	2	-	-
2	Bolt & Nut, Stainless steel, Hex. Head, M12 x 35L	2	-	-
1	Conductor Splice, Parallel Half Clamp	2	54/033522	BBB4186

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN±- ANG± - ITEM NO : -
MATERIAL : -
VERSION INFO : Redrawn & revised, serrations reinstated

Digitally signed by Willem Mans
Date: 2009.04.15 10:05:28 +02'00'
APPROVED

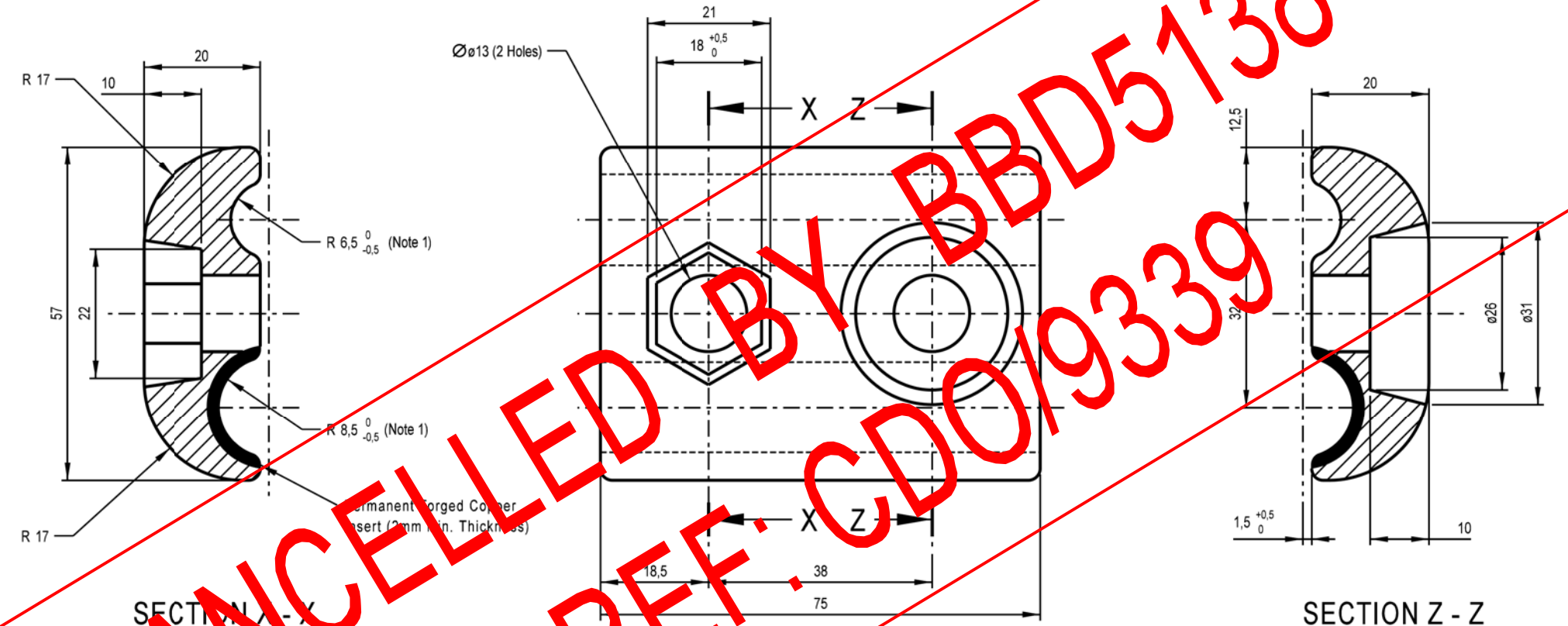
Digitally signed by Ludwig Borchard
Date: 2009.04.20 09:31:00 +02'00'
AUTHORISED

BIMETALLIC CONDUCTOR SPLICE, PARALLEL CLAMP 'SKUNK' CATENARY 25kV AC ELECTRIFICATION

TRANSNET freight rail

BBB4185
VERSION 3
A4

DO REF: CDO/6645 ECP REF: BBD6138 DRAWN: D.A. Ballabio DESIGNED: - CHECKED: J.D. van Dyk



SECTION X - X

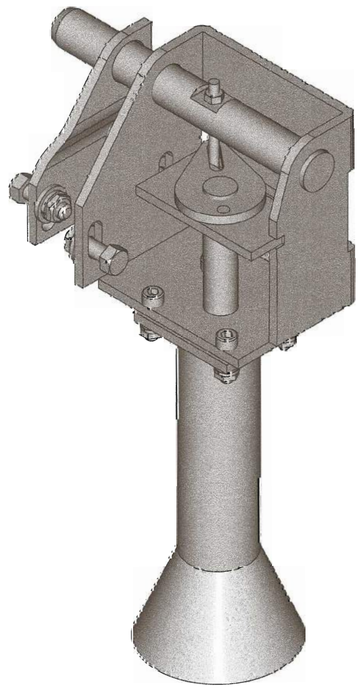
SECTION Z - Z

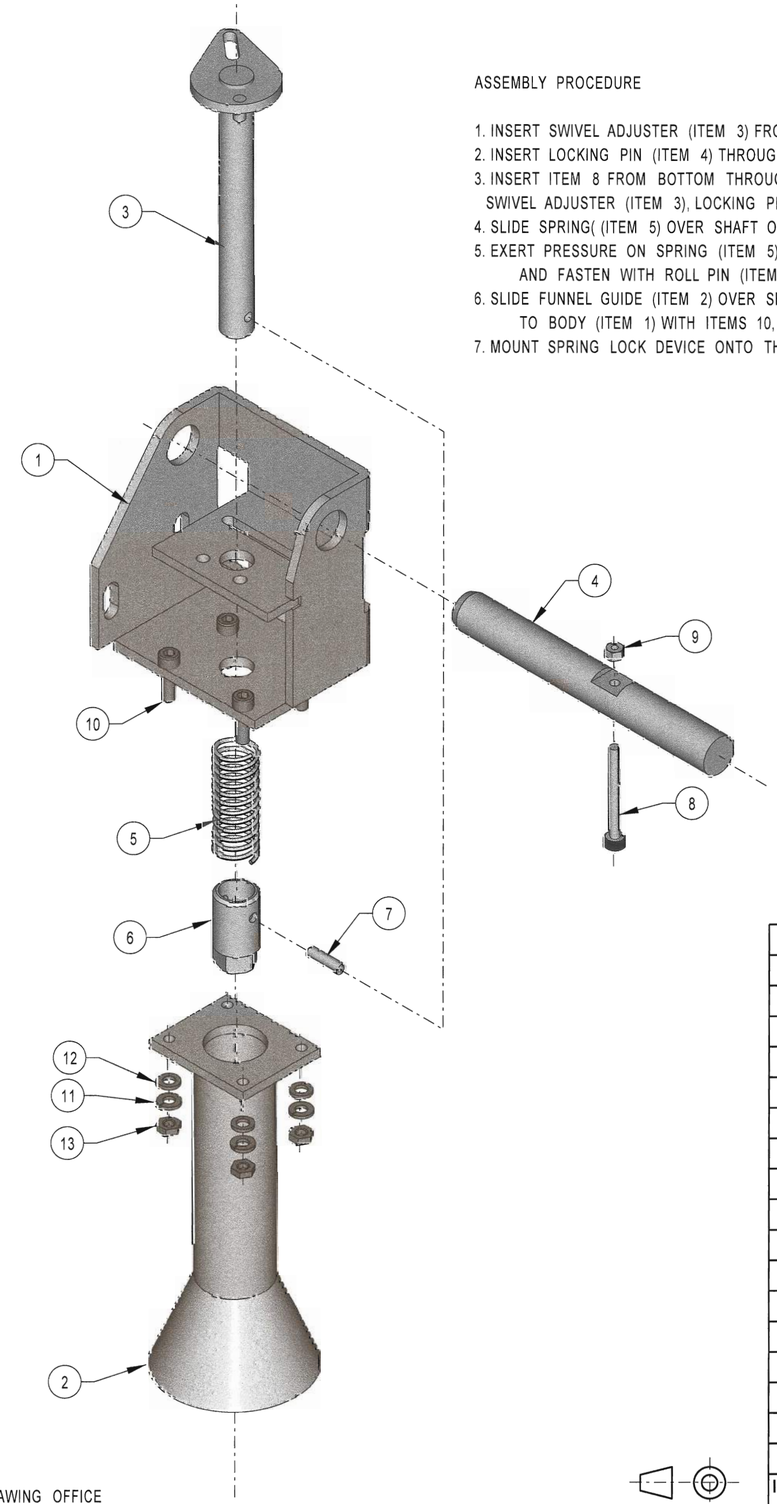
NOTE

1. Clamping surfaces to be serrated- Pitch; 1 x 0,3
2. All unspecified Radii R2.
3. For assembly. See drawing number BBB4185

DIMENSIONS : mm SCALE : 1 : 1 TOLERANCE : LIN±0,5 ANG± - MATERIAL : Aluminium grade 6063 with a premanent forged copper insert VERSION INFO : Redrawn & revised, serrations reinstated	Digitally signed by Willem Mans Date: 2009.04.15 10:06:33 +02'00' APPROVED	Digitally signed by Ludwig Borchard Date: 2009.04.20 09:32:00 +02'00' AUTHORISED	BIMETALLIC CONDUCTOR SPLICE, PARALLEL HALF CLAMP 'SKUNK' CATENARY 25kV AC ELECTRIFICATION	TRANSNET freight rail BBB4186 VERSION 3 A4

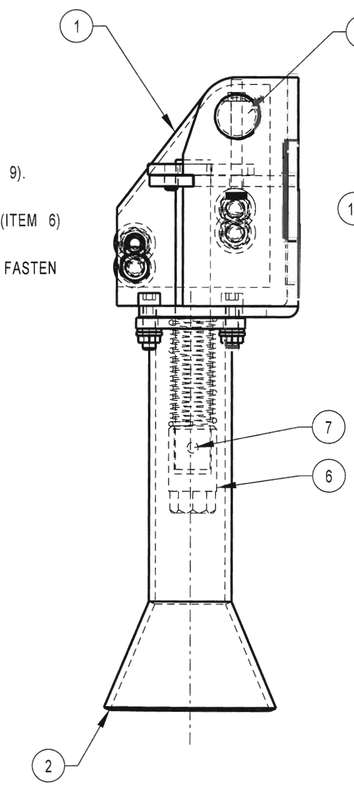
DO REF: CDO/6645 ECP REF: BBD6138 DRAWN: D.A. Ballabio DESIGNED: - CHECKED: J.D. van Dyk

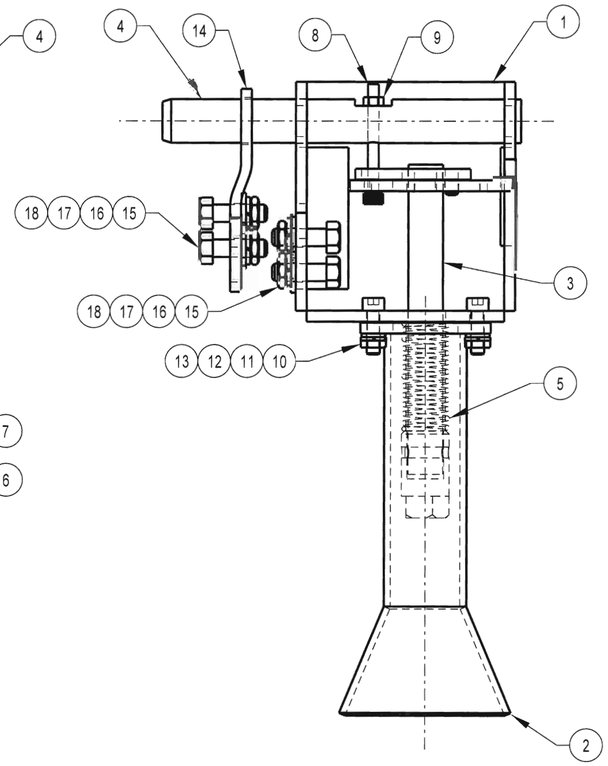




ASSEMBLY PROCEDURE

1. INSERT SWIVEL ADJUSTER (ITEM 3) FROM THE TOP INTO BODY (ITEM 1).
2. INSERT LOCKING PIN (ITEM 4) THROUGH HOLES IN BODY.
3. INSERT ITEM 8 FROM BOTTOM THROUGH SLOTS IN BODY (ITEM 1), SWIVEL ADJUSTER (ITEM 3), LOCKING PIN (ITEM 4) AND FASTEN WITH NUT (ITEM 9).
4. SLIDE SPRING((ITEM 5) OVER SHAFT OF SWIVEL ADJUSTER (ITEM 3).
5. EXERT PRESSURE ON SPRING (ITEM 5) AND INSERT REMOVABLE POLYGON NUT (ITEM 6) AND FASTEN WITH ROLL PIN (ITEM 7).
6. SLIDE FUNNEL GUIDE (ITEM 2) OVER SHAFT OF SWIVEL ADJUSTER (ITEM 3) AND FASTEN TO BODY (ITEM 1) WITH ITEMS 10, 11, 12 & 13.
7. MOUNT SPRING LOCK DEVICE ONTO THE TRACK SWITCH.





ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
18	WASHER, SPRING, STAINLESS STEEL, SQUARE SECTION, M8	4	-	-
17	WASHER, FLAT, STAINLESS STEEL, ROUND, M8	4	-	-
16	HEXAGON NUT, STAINLESS STEEL (GRADE 304), M8	4	-	-
15	HEXAGON BOLT, STAINLESS STEEL (GRADE 316), M8 x 25 LONG	4	-	-
14	LOCK PLATE, STEEL	1	-	BBB5971 Sheet 7
13	HEXAGON NUT, STAINLESS STEEL (GRADE 304), M5	4	-	-
12	WASHER, FLAT, STAINLESS STEEL, ROUND, M5	4	-	-
11	WASHER, SPRING, STAINLESS STEEL, SQUARE SECTION, M5	4	-	-
10	HEXAGON SOCKET HEAD CAP SCREW, STAINLESS STEEL (GRADE 316), PRECISION, M5 x 20 LONG	4	-	-
9	HEXAGON NUT, STAINLESS STEEL (GRADE 304), M5 (NYLOCK)	1	-	-
8	HEXAGON HEAD SOCKET CAP SCREW, STAINLESS STEEL (GRADE 316), PRECISION, M5 x 50 LONG	1	-	-
7	ROLL PIN, STEEL, Ø5 x 20 LONG	1	-	-
6	REMOVABLE POLYGON NUT	1	-	BBB5971 Sheet 6
5	HELICAL COMPRESSION SPRING	1	-	BBB5971 Sheet 5
4	LOCKING PIN	1	-	BBB5971 Sheet 4
3	SWIVEL ADJUSTER ASSEMBLY	1	-	BBB5971 Sheet 3
2	FUNNEL GUIDE SUB ASSEMBLY	1	-	BBB5971 Sheet 2
1	BODY & LOCATING PIN PLATE ASSEMBLY	1	-	BBB5971 Sheet 1

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN ± - ANG ± - ITEM NO : -
MATERIAL : -
VERSION INFO : Drawing redrawn and updated. Drawing numbers updated

DO REF : CDO/9152
ECP REF : -
DRAWN : SM MAZIBUKO
DESIGNED : -
CHECKED : DA BALLABIO

W. Schloms 2018/10/11 APPROVED

AUTHORISED 2018-10-11

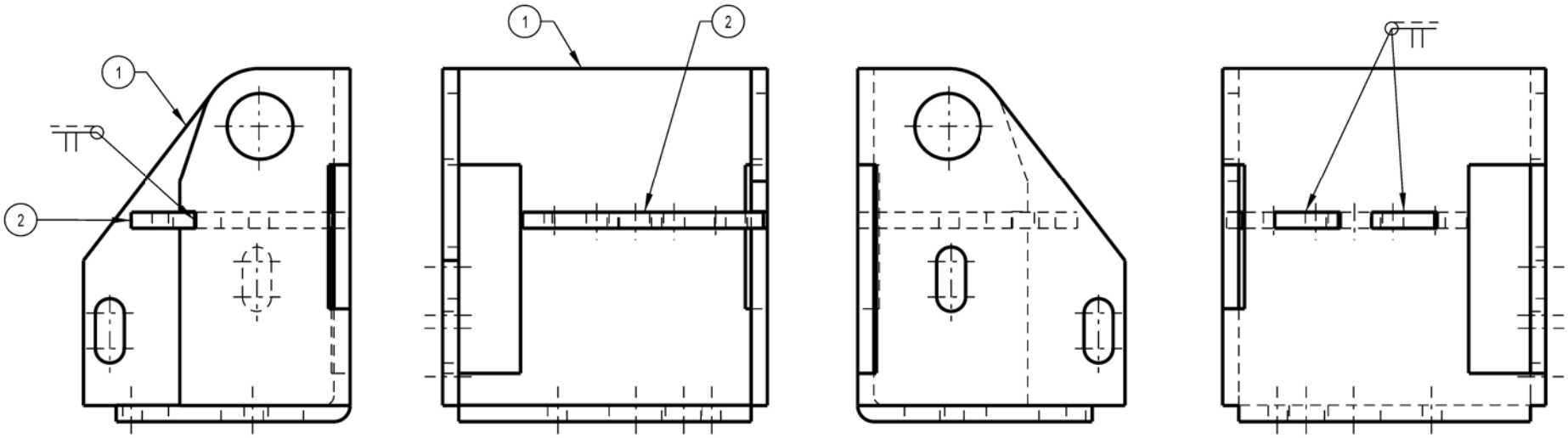
TAMPER RESISTANT SPRING LOCK DEVICE SUB ASSEMBLY FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

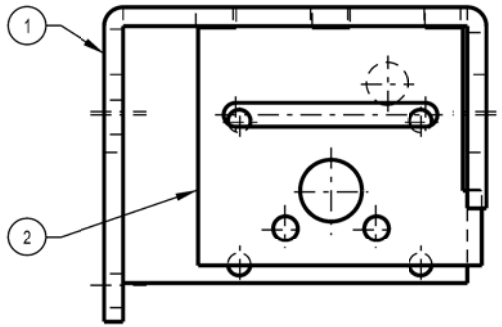
BBB5971

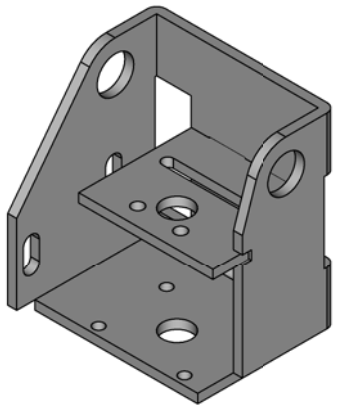
VERSION 5

A2



REAR VIEW





FINISH
HOT DIP GALVANISE TO SANS 121 AFTER WELDING.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	LOCATING PIN PLATE	1	-	BBB5971 Sheet 1-2
1	BODY	1	-	BBB5971 Sheet 1-1

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN ±0,5 ANG -± ITEM NO: -
MATERIAL : -
VERSION INFO : -

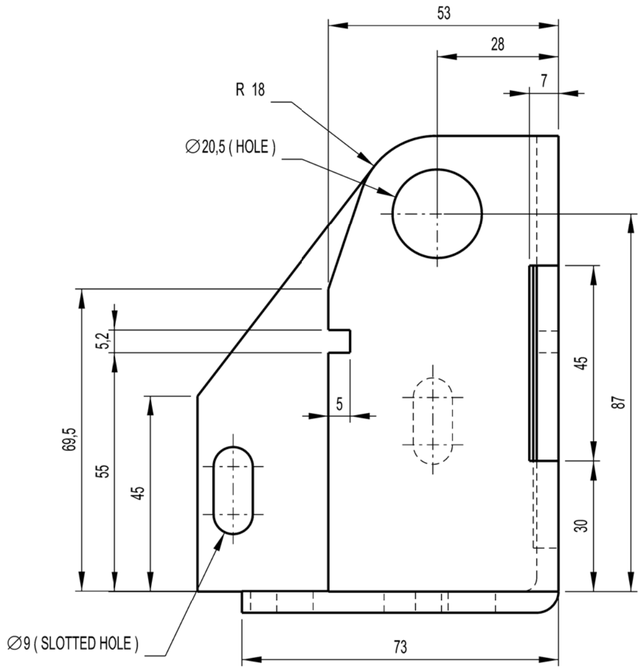
DRAWN : SM MAZIBUKO CHECKED : DA BALLABIO

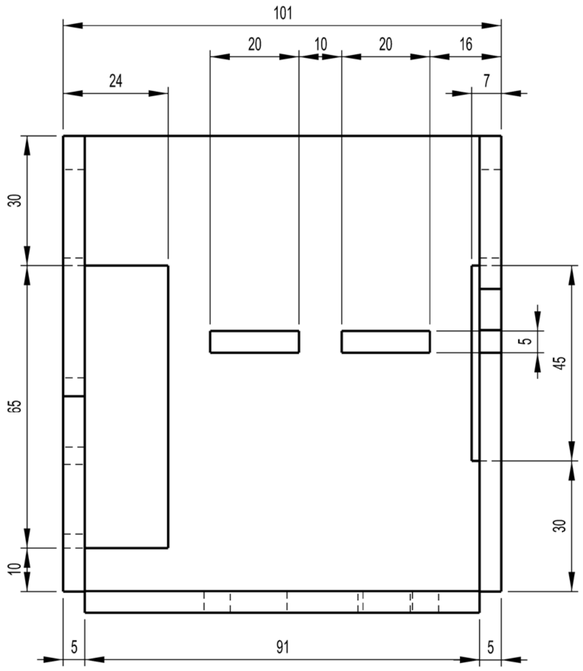
BODY / LOCATING PIN PLATE SUB ASSEMBLY TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

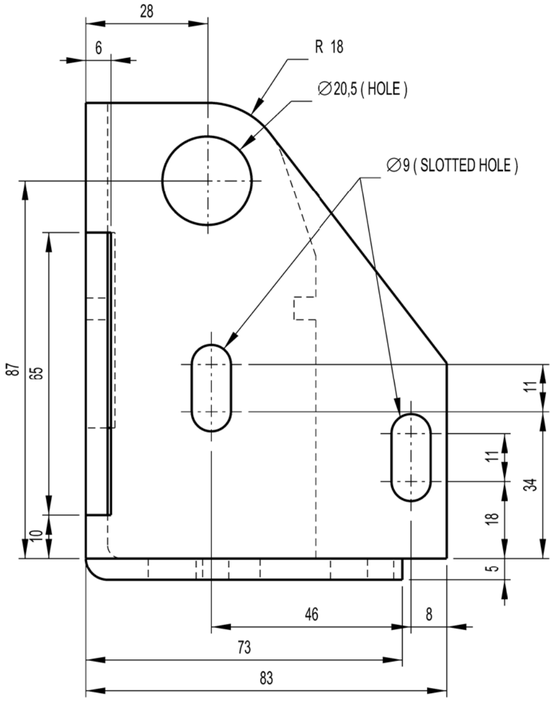
TRANSNET freight rail

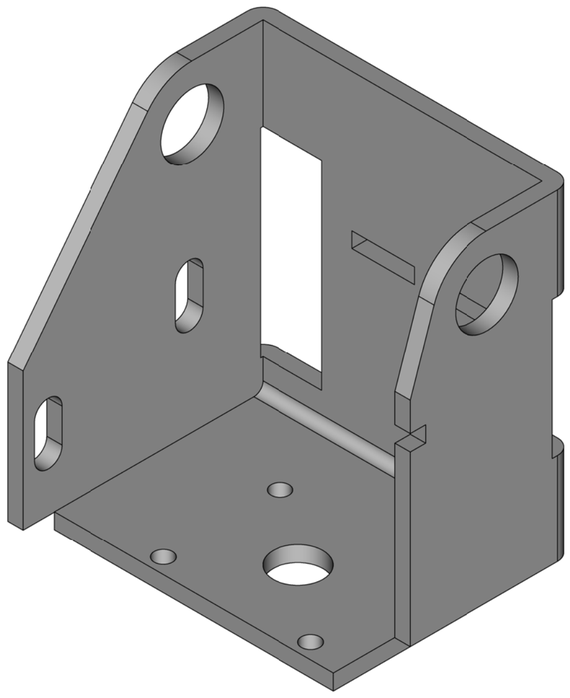
BBB5971 Sheet 1

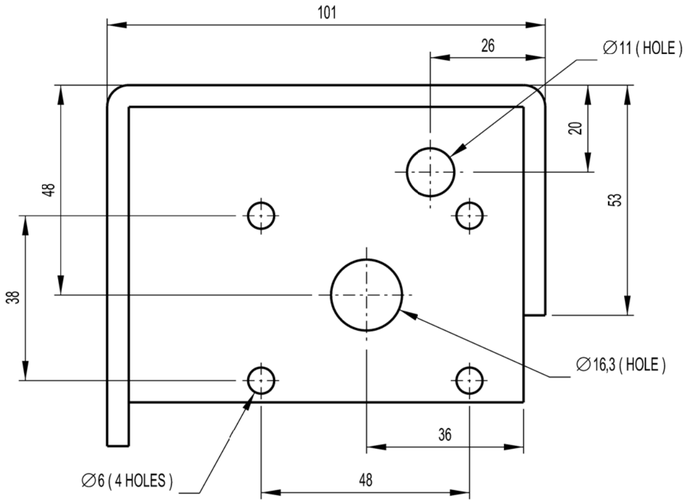
A4

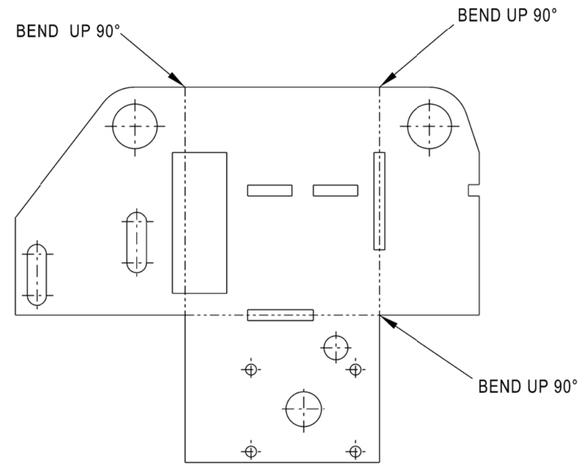












TYPICAL DEVELOPED VIEW.
NOT DRAWN TO SCALE

DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN ± 0.5 ANG ± -		
MATERIAL	: PLATE, STEEL, 227 x 179 x 5 THICK		
DRAWN	: SM MAZIBUKO	CHECKED	: DA BALLABIO

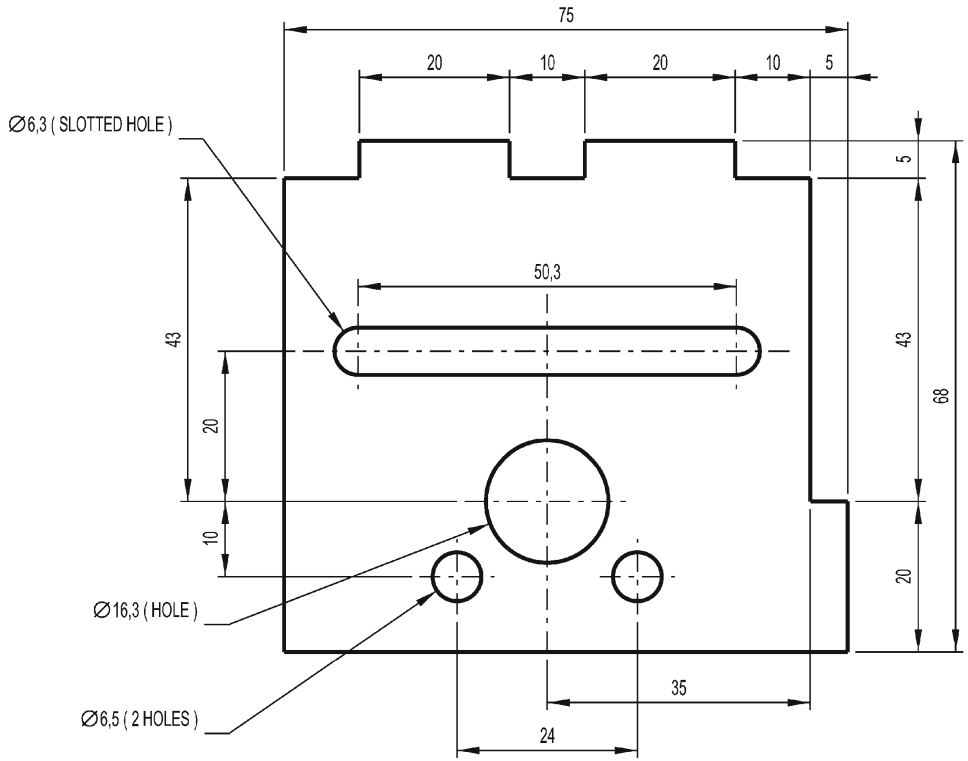
BODY, TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

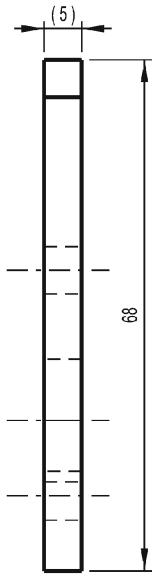
TRANSNET freight rail

BBB5971 Sht 1-1

VERSION 5

A2





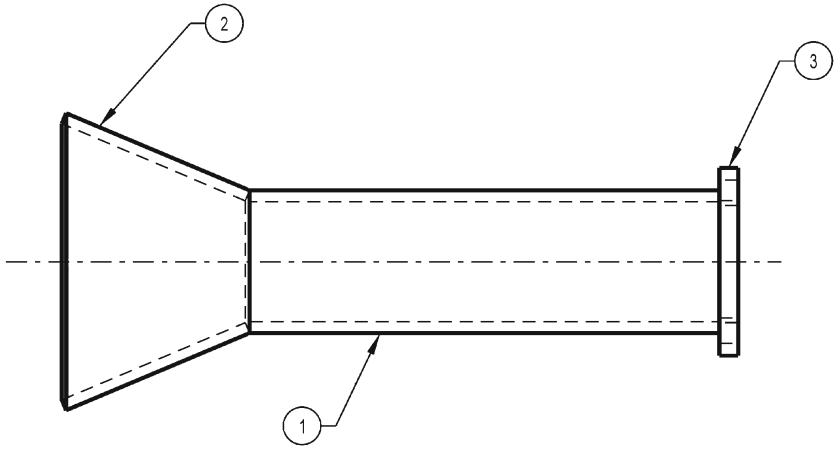
DIMENSIONS mm	SCALE 1 1
TOLERANCE LIN± 0.5 ANG± -	
MATERIAL : PLATE, STEEL, 75 x 68 x 5 THICK	
DRAWN SM MAZIBUKO	CHECKED DA BALLABIO

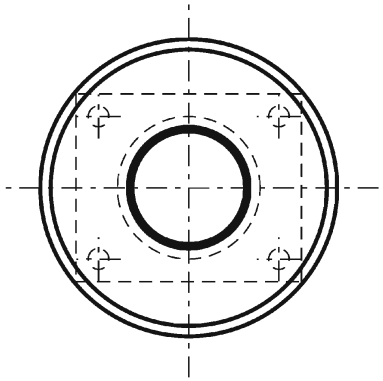
LOCATING PIN PLATE. TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

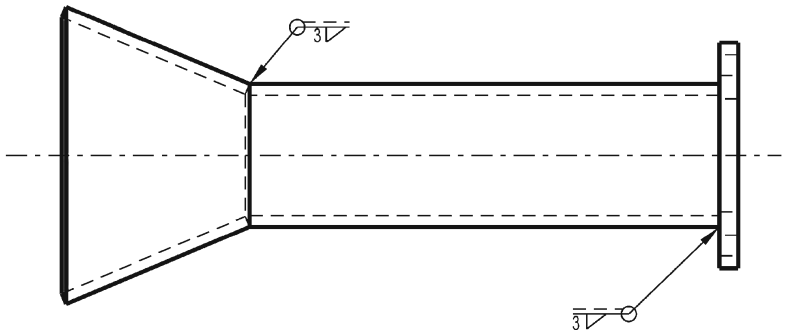
TRANSNET freight rail

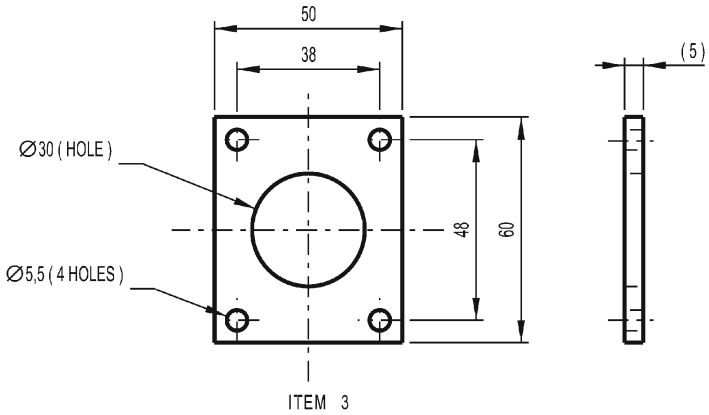
BBB5971 Sheet 1-2

A4

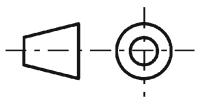








NOTE
HOT DIP GALVANISE TO SANS 121 AFTER WELDING



ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	PLATE, STEEL, 60 x 50 x 5THK	1	-	-
2	GUIDE CONE	1	-	BBB5971 Sheet 2-1
1	TUBE, STEEL, ø38 O.D. x 3mm WALL THICKNESS x 125L	1	-	-

DIMENSIONS mm SCALE · 1 2
TOLERANCE LIN± 0.5 ANG± -
MATERIAL . -

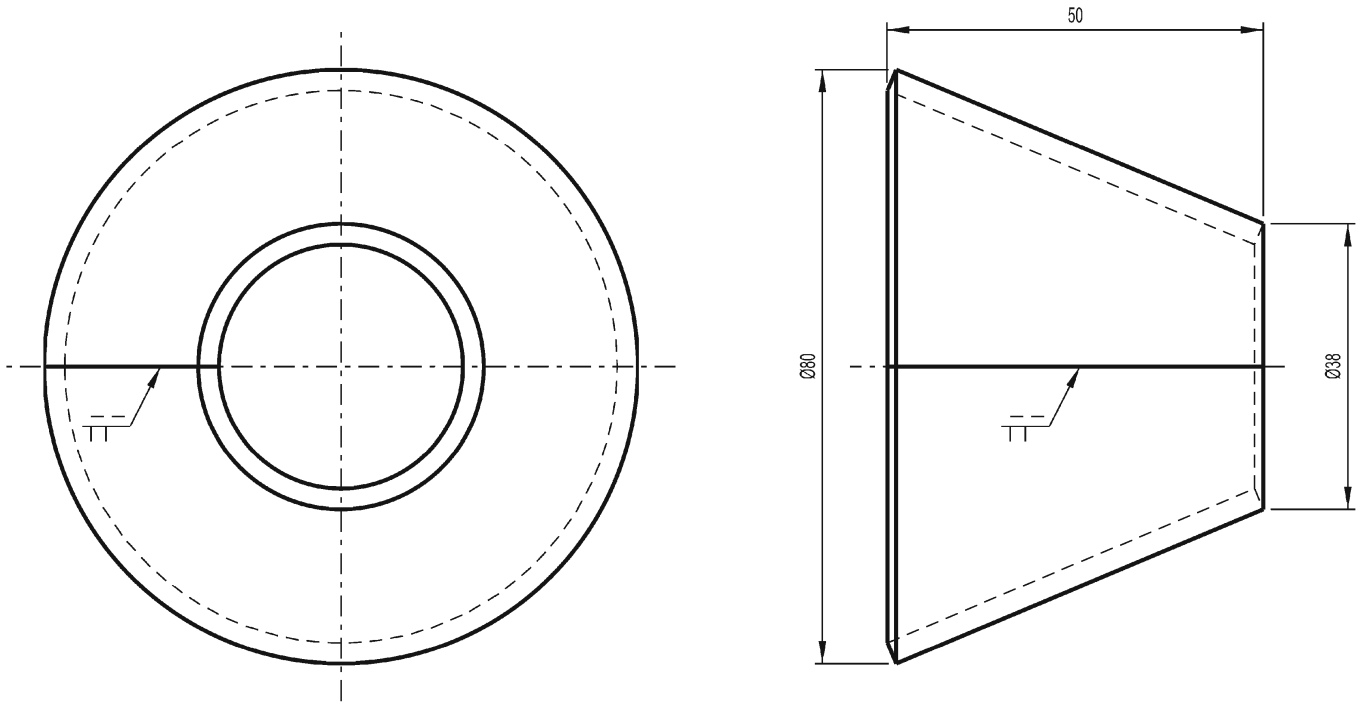
DRAWN · SM MAZIBUKO CHECKED · DA BALLABIO

FUNNEL GUIDE SUB ASSEMBLY TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

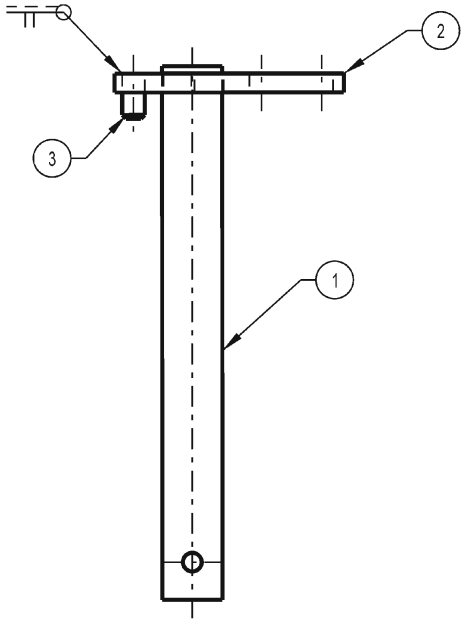
TRANSNET freight rail

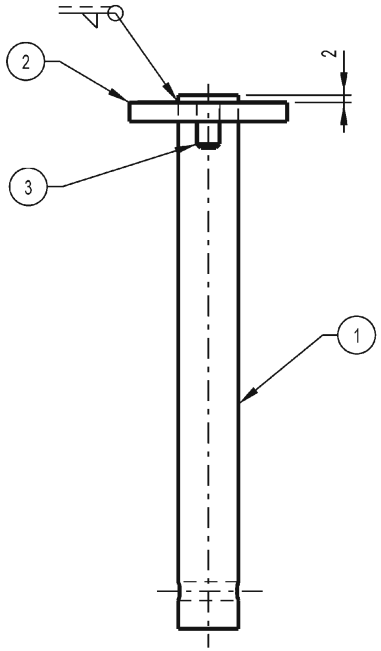
BBB5971 Sheet 2

A4

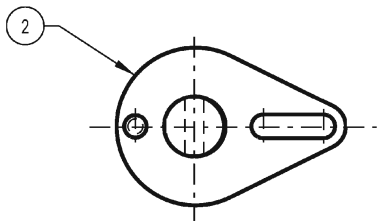


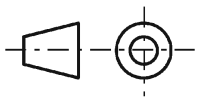
DIMENSIONS mm SCALE · 1 1 TOLERANCE LIN± 0.5 ANG± - MATERIAL . PLATE, STEEL, 50 x 3 x 490 LONG DRAWN · SM MAZIBUKO CHECKED · DA BALLABIO	GUIDE CONE	TRANSNET freight rail BBB5971 Sheet 2-1 A4





FINISH
HOT DIP GALVANISE TO SANS 121 AFTER WELDING.





ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	ROUND BAR, STEEL, Ø6 x 15L	1	-	-
2	SWIVEL ECCENTRIC	1	-	BBB5971 Sheet 3-2
1	LINK STICK CONNECTING ROD	1	-	BBB5976 Sheet 3-1

DIMENSIONS mm SCALE 1 : 2
TOLERANCE LIN± 0.5 ANG± -
MATERIAL . -

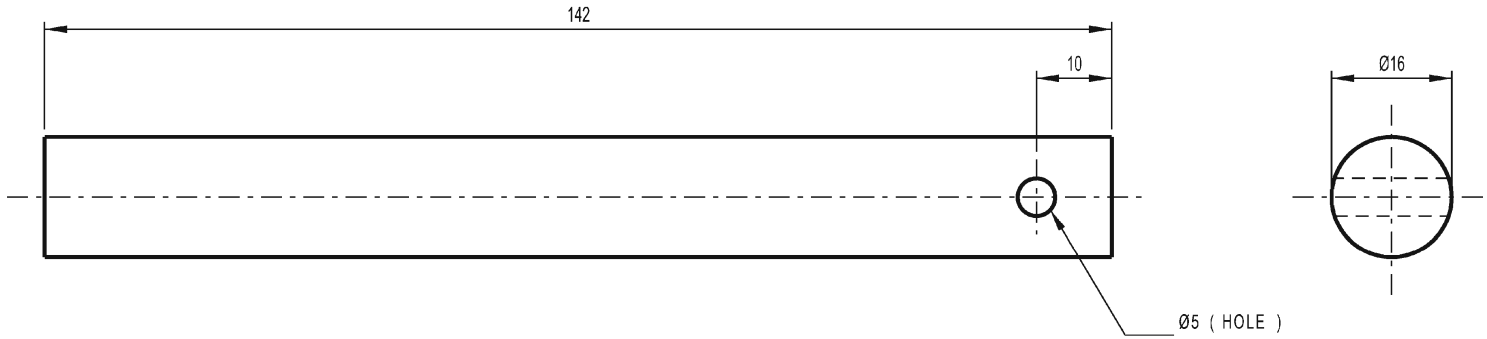
DRAWN : SM MAZIBUKO CHECKED DA BALLABIO

SWIVEL ADJUSTER SUB ASSEMBLY TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 3

A4



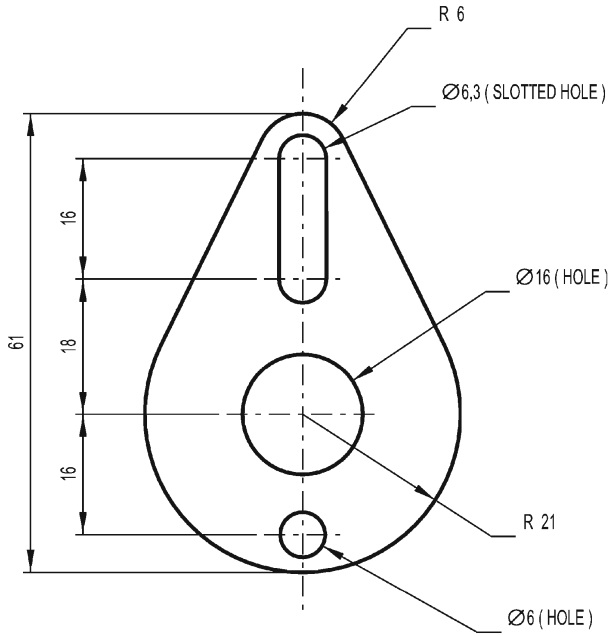
DIMENSIONS	mm SCALE · 1 1
TOLERANCE	LIN± 0.5 ANG± -
MATERIAL	. ROUND BAR. STEEL, Ø16 x 142 LONG
DRAWN · SM MAZIBUKO	CHECKED · DA BALLABIO

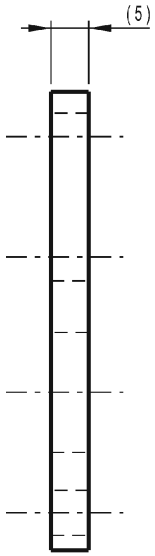
LINK STICK CONNECTING ROD. TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 3-1

A4





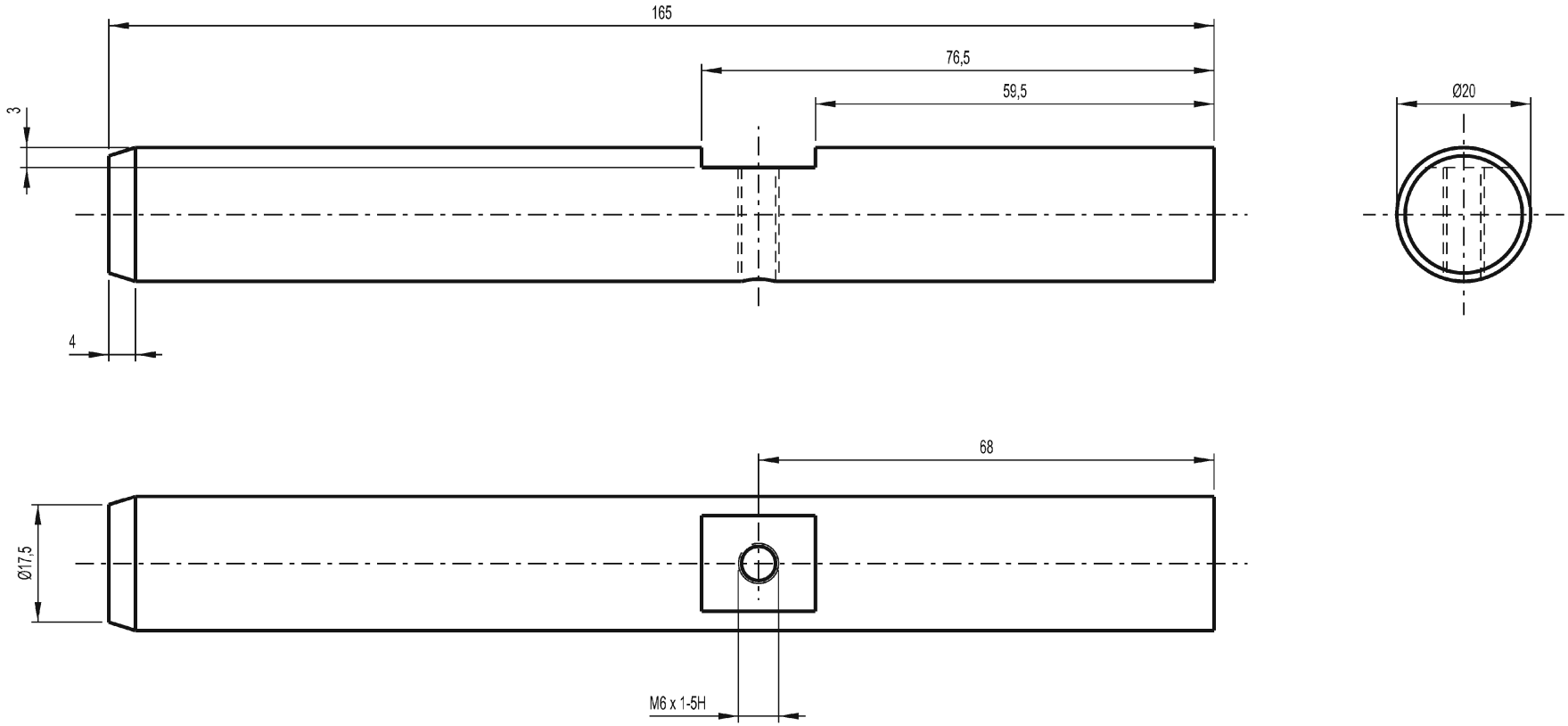
DIMENSIONS	mm SCALE 1 : 1
TOLERANCE	LIN± 0.5 ANG± -
MATERIAL	. PLATE, STEEL. 61 x 42 x 5 THICK
DRAWN	SM MAZIBUKO
CHECKED	DA BALLABIO

SWIVEL ECCENTRIC. TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 3-2

A4



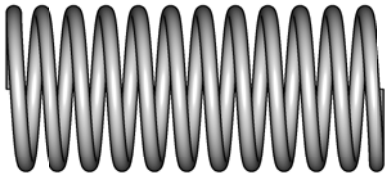
DIMENSIONS	mm SCALE · 1 1
TOLERANCE	LIN± 0.5 ANG± -
MATERIAL	. ROUND BAR, STAINLESS STEEL (GRADE 316), Ø20 x 165 LONG
DRAWN · SM MAZIBUKO	CHECKED · DA BALLABIO

LOCKING PIN TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 4

A4



ESSENTIAL DATA	
NOMINAL WIRE DIAMETER	ø2 STAINLESS STEEL WIRE, GRADE 304
DIAMETER: INSIDE	ø18 $^{+1}_{0}$
FREE LENGTH	60 ±1
NUMBER OF COILS (APPROX.)	12
FORM OF END COILS	CLOSED AND GROUND
LOAD RANGE	100mm = 46N ±10%

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± - ANG± -
MATERIAL : -

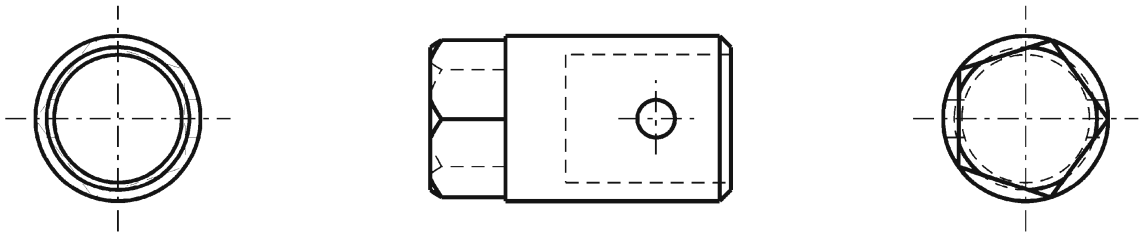
DRAWN : SM MAZIBUKO CHECKED : DA BALLABIO

HELICAL COMPRESSION SPRING TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC & RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 5

A4



POLYGON MANUFACTURING DETAIL ONLY AVAILABLE TO SUCCESSFUL TENDERER. (SEE DRAWING NO. BBB6022)

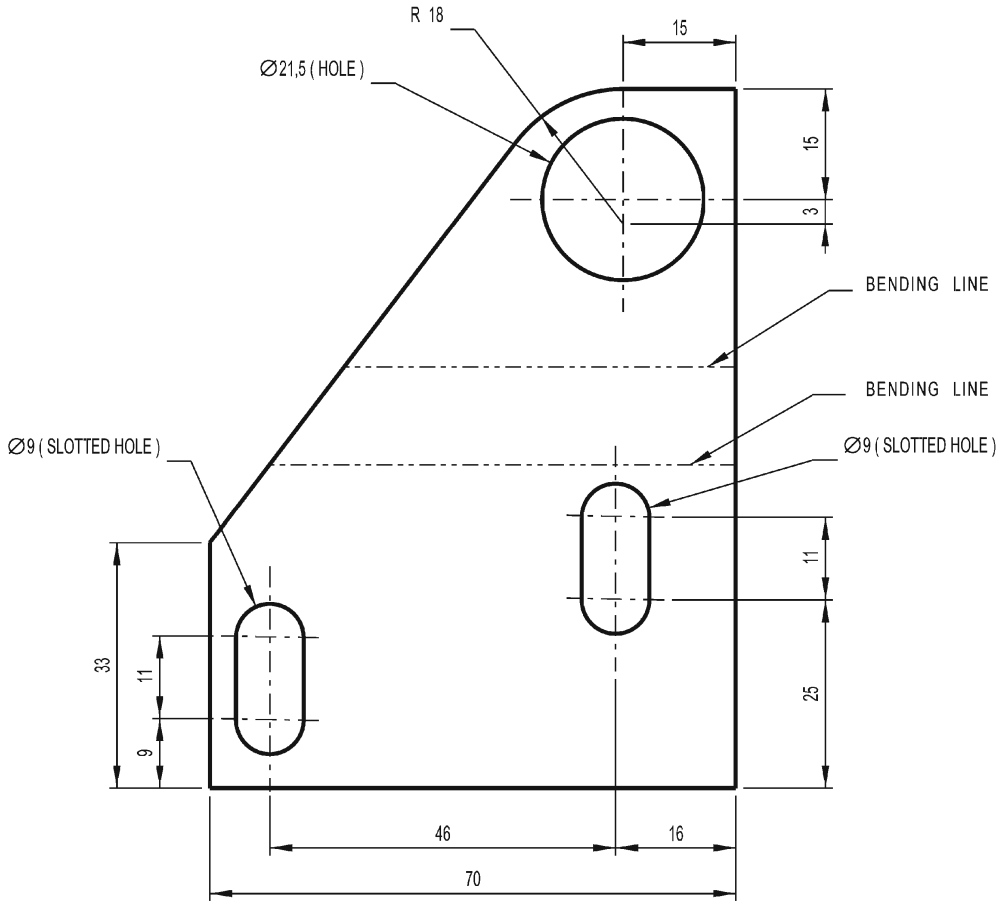
DIMENSIONS mm	SCALE -
TOLERANCE LIN± -	ANG± -
MATERIAL . ROUND BAR, STEEL, Ø22 x 40 LONG	
DRAWN · SM MAZIBUKO	CHECKED DA BALLABIO

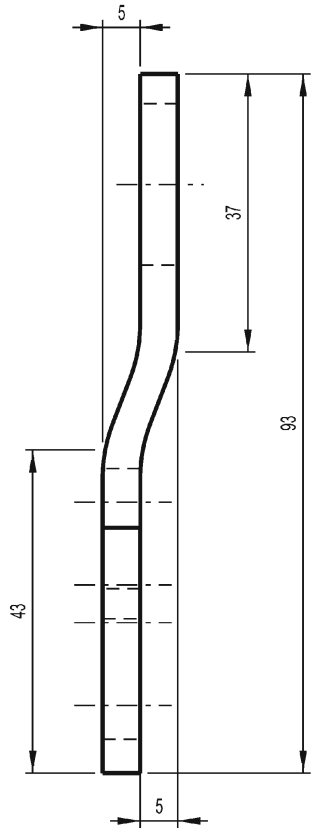
REMOVABLE POLYGON NUT (LINK STICK) TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 6

A4





FINISH
HOT DIP GALVANISE TO SANS 121

DIMENSIONS mm	SCALE 1 : 1
TOLERANCE LIN± 0.5 ANG± 0.5°	
MATERIAL . PLATE, STEEL. 94 x 70 x 5 THICK	
DRAWN : SM MAZIBUKO	CHECKED DA BALLABIO

LOCK PLATE. TAMPER RESISTANT SPRING LOCK DEVICE FOR TRACK SWITCHES (UC AND RAIL MASTS)

TRANSNET freight rail

BBB5971 Sheet 7

A4

A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

RAIL AND MAST BOND FASTENERS

Author:	Engineering Technician Technology Management	M Masupha	.....
Approved	Senior Engineer Technology Management	LO Borchard	.....
Authorised:	Principal Engineer Technology Management	S E Sibande	SE Sibande .....

Date: 22 February 2021

Circulation Restricted To:

Transnet and Relevant Third Parties

"I acknowledge that this application contains personal information as defined in the Protection of Personal Information Act, 2013 (the "Act"). By accessing/using this application, I consent to the processing of my personal information in accordance with the requirements of the Act. I acknowledge that I cannot unreasonably withhold my consent. I acknowledge that the purpose for processing my personal information is in terms of this application."

LIST OF AMENDMENTS TO THE SPECIFICATION

Version No.	Date Issued	Clause No.	Page No.	Remarks
4	07/06/2019			
5	22/02/2021			
		11.2	6	Clause amended
		11.3	6	Clause amended

TABLE OF CONTENTS

,

1.0 SCOPE

1.1 This specification details Transnet's requirements for rail and mast bond fasteners for application on all types and sizes of rail and masts.

2.0 BACKGROUND

2.1 Transnet requires a standardized rail and mast bond fastening system based on the expanded collar fastening.

3.0 NORMATIVE REFERENCES

Unless otherwise specified all materials used, equipment developed and supplied shall comply with the latest edition of the relevant Transnet publications.

3.1 TRANSNET PUBLICATIONS:

3.1.1 BBC 7863: Connection of bonds to OHTE Steel Structures.

3.1.2 BBC 7864: Connection of OHTE Bonds to web of rail (rail methods).

4.0 SERVICE CONDITIONS

4.1 ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level
Relative humidity:	10% to 90%
Ambient temperature:	-10° C to +55° C
Wind pressure:	750 Pa
Lightning conditions:	20 ground flashes/km2 per annum
Pollution:	Heavily salt laden with industrial pollutants including diesel- electric locomotive emissions.

5.0 TECHNICAL REQUIREMENTS

5.1 MECHANICAL REQUIREMENTS

5.1.1 An expanded collar fastener with non-vibrating washers for use with bonding on rails and mast shall be provided.

5.1.2 The fastener shall be installed as per drawing BBC 7863 and BBC 7864.

5.1.3 Transnet has standardized on a 13.5 mm hole size for expanded collar fastener for bonding.

5.1.4 Both single sided and back-to-back systems shall only require a single hole.

5.1.5 The system shall be safe to use in all weather conditions.

5.1.6 The system shall be designed so that one size/length expanded collar shall be used for all rail and mast sizes.

5.1.7 The rail web thickness can vary from 11.5 to 19 mm.

5.1.8 The mast web thickness can vary from 7.5 to 10.5 mm.

5.1.9 The fastener shall comprise of and expandable tinned copper collar.

5.1.10 The area of the expandable collar in contact with the rail shall have a contact area not less than the contact area of the flange.

5.1.11 The diameter of the collar should at least be 31 mm.

5.1.12 The fastening pin shall have an M12 thread.

5.1.13 Non-vibrating wedge lock washers shall be used on both sides to prevent nut loosening.

5.1.14 Similar washers than the approved Nord Lock and Heico-Lock may be offered subjected to tests and approval by the Transnet Freight Rail, Technology Management (Electrical Technology) department.

5.2 ELECTRICAL REQUIREMENTS

5.2.1 The continuous current rating for the fastener system shall be a minimum of 100A for both AC and DC.

5.2.2 The fastener system shall not exceed a rise in temperature of more than 3 degrees Celsius in relation to the rail when exposed to the continuous rated current of the bond.

6.0 TESTING AND INSPECTIONS

6.1 Transnet reserves the right to be present at all tests and inspections as called for in this clause.

6.2 The responsibility of arranging the tests called for in this clause rests with the successful tenderer.

6.3 A Transnet Freight Rail, Technology Management (Electrical Technology) department representative may request any additional test deemed necessary to ensure compliance.

7.0 RATING PLATE AND INSTRUCTION LABELS

7.1 Each fastener shall be clearly marked on the outer surface of the flange, the identification mark of the manufacturer.

7.2 The mark shall under no circumstances influence the integrity of the connection.

7.3 The continuous current rating of the flange shall also be depicted on the flange.

8.0 DOCUMENTATION REQUIREMENTS

8.1 Drawings and technical documentation shall be submitted with tender.

8.2 The manufacturer must provide one soft copy and two hard copies of the technical specification.

8.3 The manufacturer must provide one soft and two hard copy of the method of installation.

8.4 The manufacturer must provide design and type test certificates to verify conformance to the requirements and these must be submitted with tender documents.

8.5 Supplier shall advise how to proceed with the equipment at the end of its operating life, taking into consideration environmental requirements and regulations.

9.0 PACKAGING, STORAGE AND HANDLING

9.1 Each fastener set shall be packaged with a user instruction and the package be clearly marked with the torque value.

9.2 There shall be a maximum of 20 fasteners per box.

10.0 GUARANTEE AND DEFECTS

10.1 The appointed tenderer shall guarantee that the supplied rail and mast bond fastener conforms to Transnet's requirements.

10.2 The appointed tenderer shall accept liability for makers' defects, which may appear in design, material and workmanship.

10.3 The appointed tenderer shall provide all information regarding guarantees and warranties in writing

11.0 METHOD OF TENDERING

11.1 Tenderers shall indicate clause-by-clause compliance document with the specification. This shall take the form of a separate document listing each of the specification's clause and sub-clause numbers, indicating the individual statements of compliance or non-compliance.

11.2 Statement of non-compliance shall be motivated by the tenderer in a letter format, as per 11.1. The letter and evidence of deviation shall be submitted as part of the tender document.

11.3 Tenderer shall submit comprehensive literature consisting of detailed technical specifications in accordance to clause 5.0 (Technical Requirements), the general constructional details and principal dimensions if not indicated on the provided Transnet Drawings.

11.4 Any items offered in accordance with other standards will be considered at the sole discretion of Transnet. The tenderer shall supply full details stating where the item differs from these specifications as well as supplying a copy (in English) of the recognized standard specification(s) with which it complies. Any deviations must be approved by Transnet Freight Rail, Technology Management (Electrical Technology) department in writing.

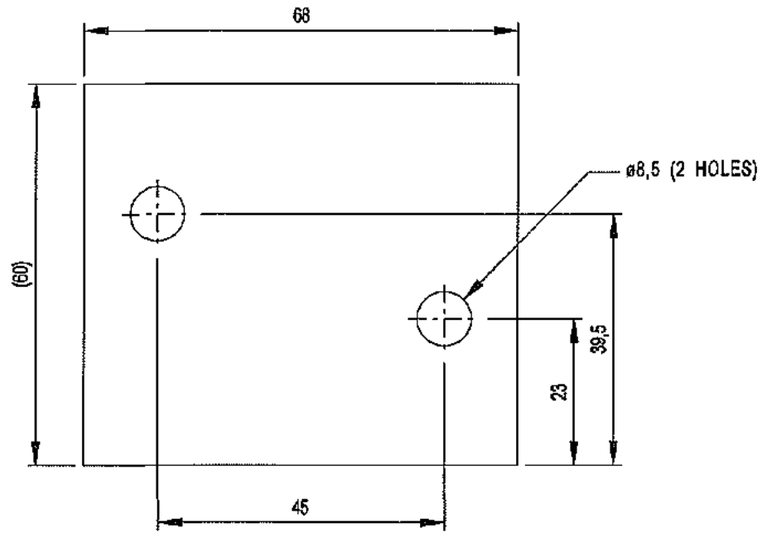
11.5 Failure to comply with clauses 11.1, 11.2, 11.3 and 11.4 could preclude a tenderer from consideration.

11.6 In the event of any conflict between the various submitted relevant documents, the order of precedence shall be, and in consultation with Transnet Freight Rail, Technology Management (Electrical Technology) department:

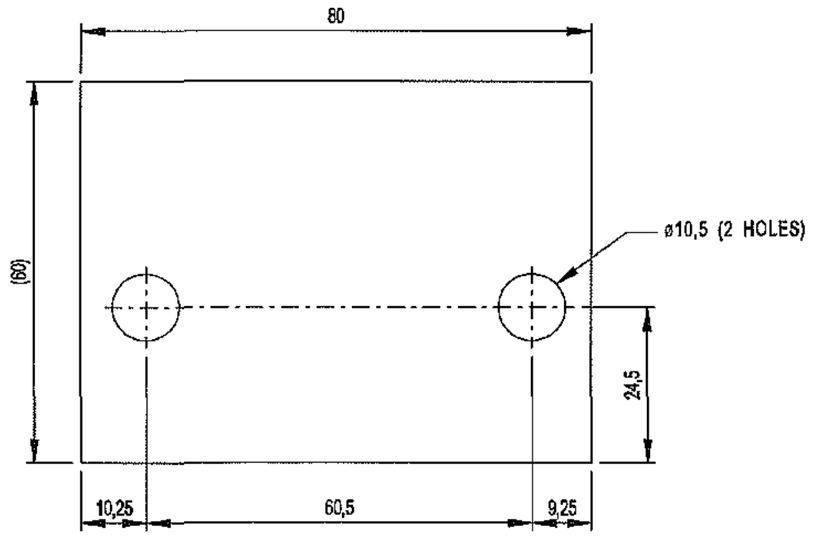
a) Legal and safety requirements.

b) This Specification.

END



ITEM 1



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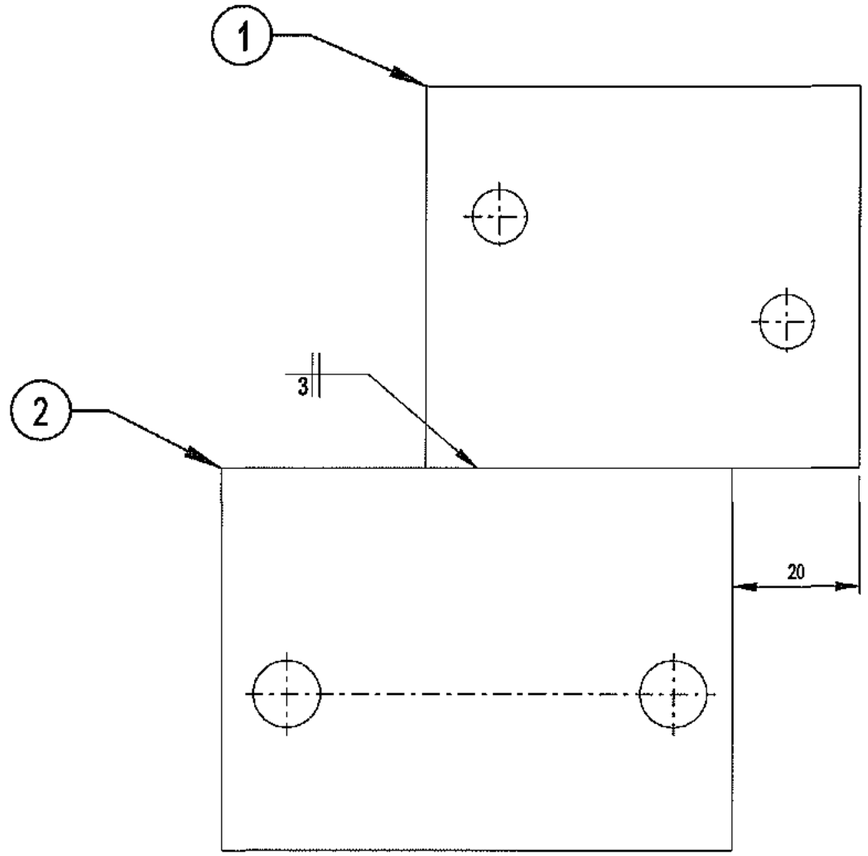


ASSEMBLY

FINISH

Hot dip galvanise assembly to SANS 121 after welding and drilling.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	Flat Bar, Steel (60 x 6 x 80L)	1	-	-
1	Flat Bar, Steel (60 x 6 x 68L)	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± -
MATERIAL : -
VERSION INFO : -

DO REF : CDO/ 5322
CP REF : -
DRAWN : C L Buckle
DESIGNED : W F Mans
CHECKED : J D van Dyk

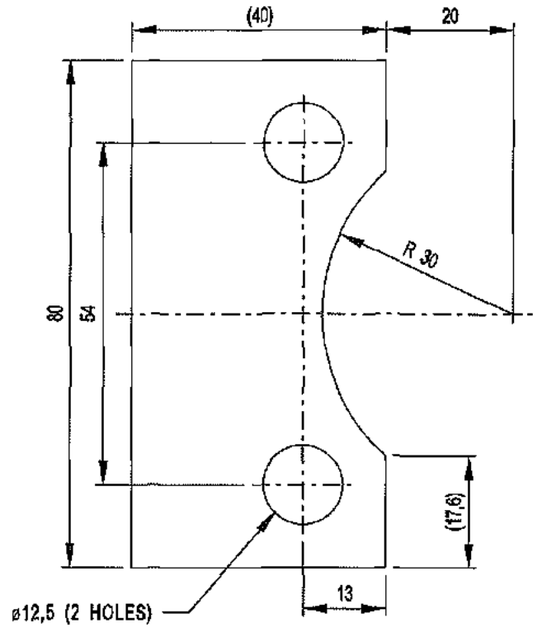
DATE: 27/09/2007
APPROVED
AUTHORISED

MOUNTING BRACKET FOR 25kV AC SWITCH LOCKING MECHANISM

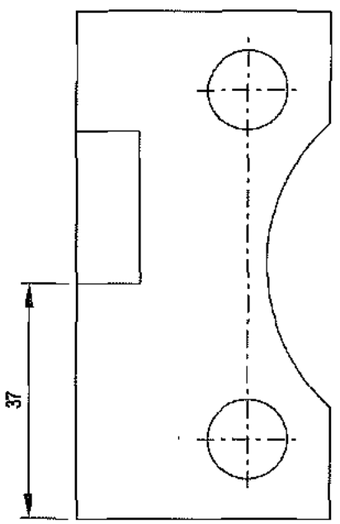
SPOORNET

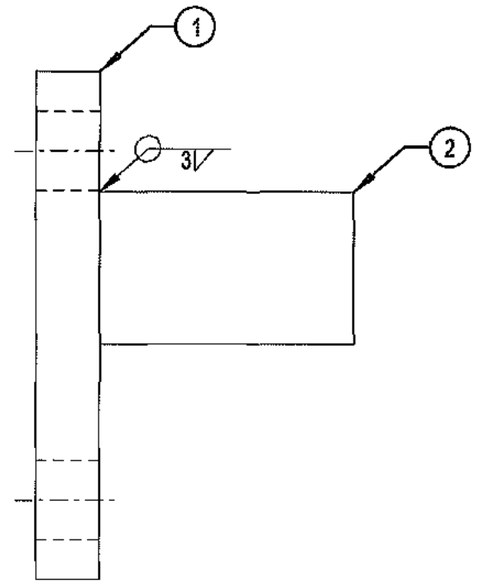
BBC6440

VERSION 1 A3



ITEM 1





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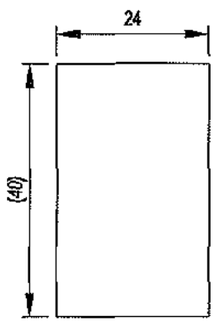


ITEM 2

FINISH

Hot dip galvanise assembly to SANS 121 after welding and drilling.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	Flat Bar, Steel (40 x 10 x 24L)	1	-	-
1	Flat Bar, Steel (40 x 10 x 80L)	1	-	-

DIMENSIONS : mm
TOLERANCE : LIN± 0,5 ANG± -
MATERIAL : -
VERSION INFO : -
SCALE : 1 : 1
ITEM NO : -

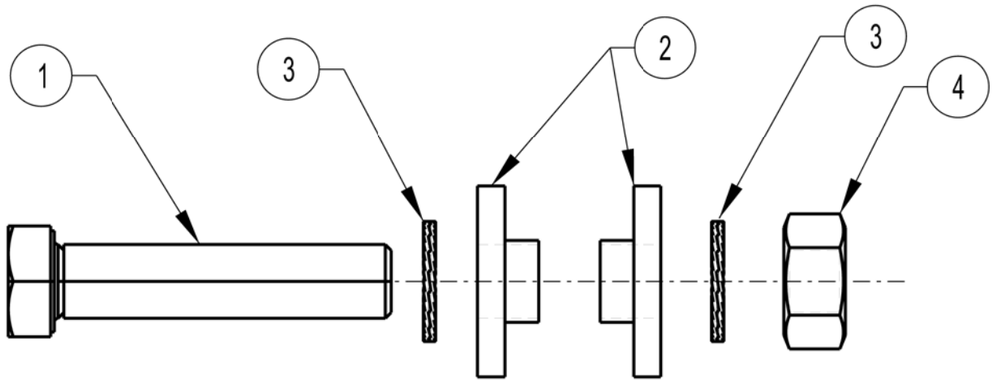
DO REF : CDO/ 5322
CP REF : -
DRAWN : C L Buckle
DESIGNED : W F Mans
CHECKED : J D van Dyk

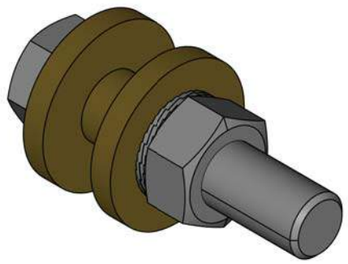
DATE: 27/09/2007
APPROVED
AUTHORISED

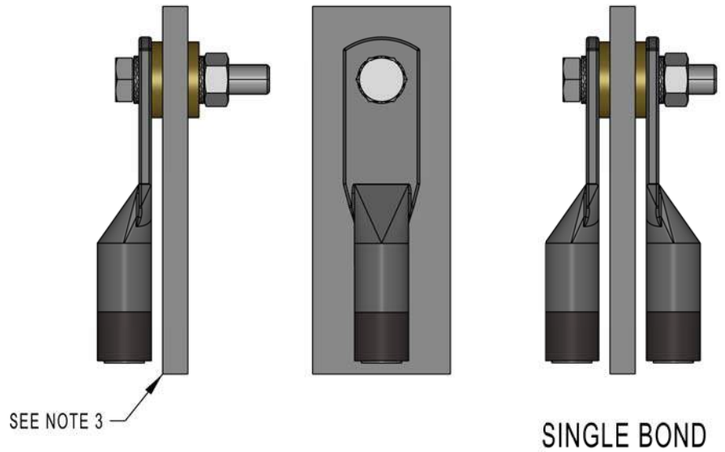
INSULATOR LOCK FOR 25kV AC SWITCH LOCKING MECHANISM

SPOORNET

BBC6441
VERSION 1
A3





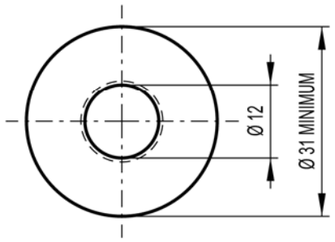


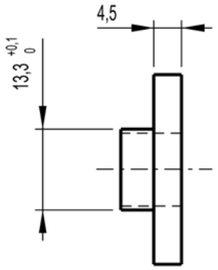
SINGLE BOND

NTS

SINGLE BOND
BOTH SIDES

NTS





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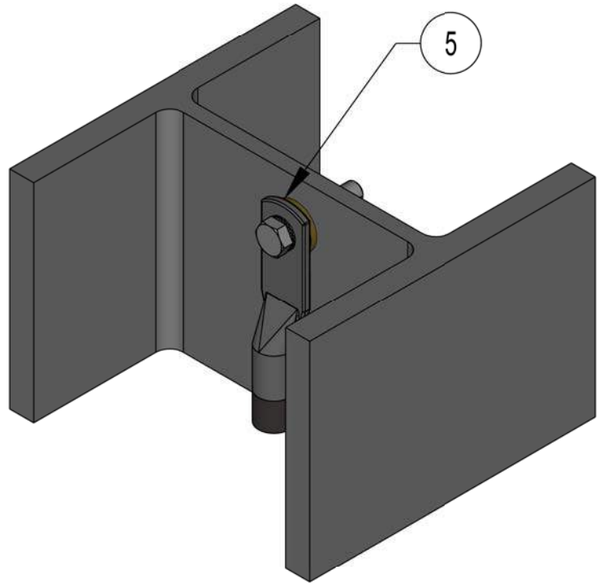


NOTE
1. FOR MAST BOND FASTENER SEE SPECIFICATION BBB6017.
2. TORQUE ASSEMBLY ACCORDING TO MANUFACTURER'S SPECIFICATION.
3. ASSEMBLY TO FIT MAST FLANGE RANGE OF 7,5mm TO 10,5mm.
4. DRILL Ø13,5mm HOLE IN MAST FLANGE.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
5	TERMINAL LUG	AS REQ.	-	CEE-TU-0136
4	NUT, HEXAGON, STAINLESS STEEL TO SPEC AISI GRADE 316, M12	1	-	-
3	WEDGE LOCKING WASHER, STAINLESS STEEL TO SPEC AISI GRADE 304, M12	2	-	-
2	TINNED COPPER COLLAR WEDGE	2	-	-
1	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC AISI GRADE 304, M12 x 50.	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 1° ITEM NO : -
MATERIAL : -

VERSION INFO : QUANTITY OF ITEM 3 CHANGED.

28/02/2024
APPROVED : W SCHOEMAN

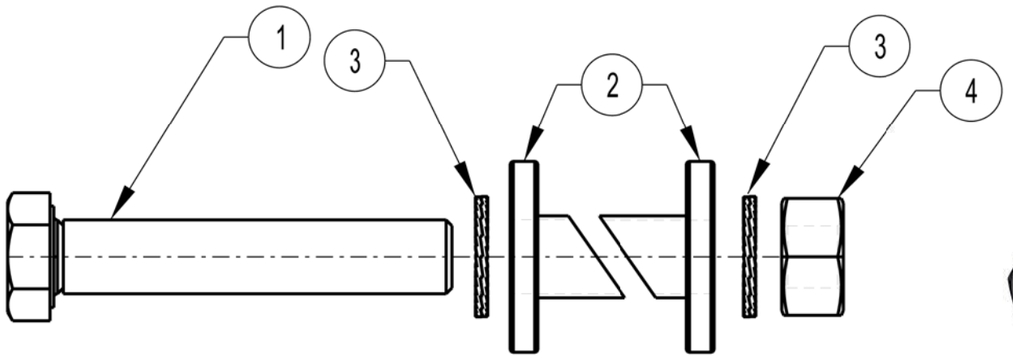
T Govender
AUTHORISED : T GOVENDER

CONNECTION OF BONDS TO OHTE STEEL STRUCTURES

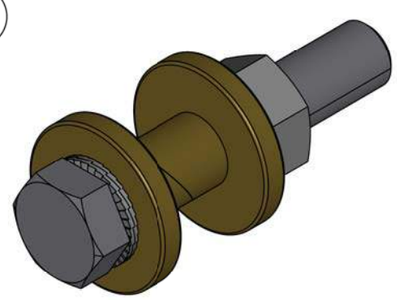
TRANSNET freight rail

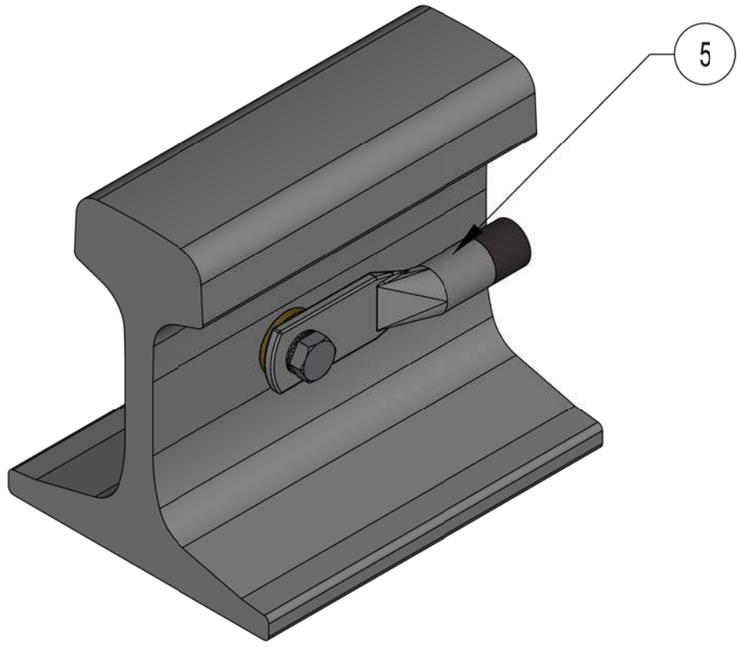
BBC7863
VERSION 4 A3

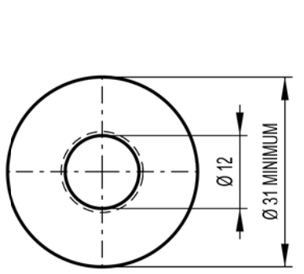
DO REF: CDO/ E0471 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

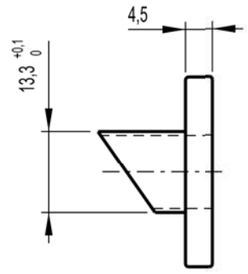


RAIL BOND CONNECTION ASSEMBLY

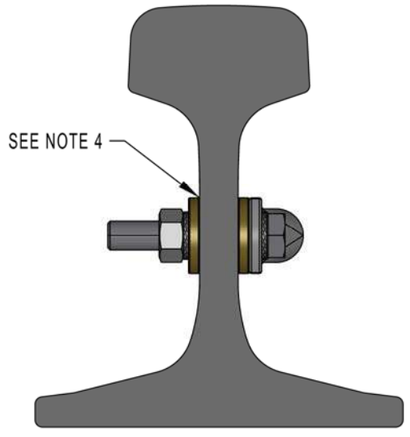




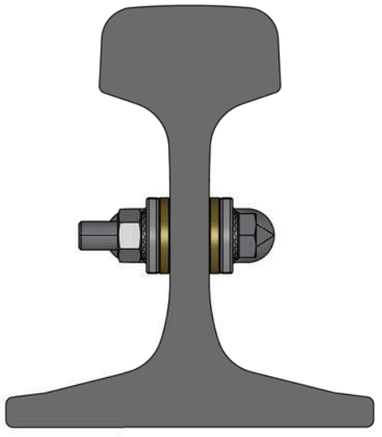




ITEM 2



SINGLE BOND
NTS



SINGLE BOND
BOTH SIDES
NTS

NOTE
1. FOR RAIL BOND FASTENERS SEE SPECIFICATION BBB6017.
2. TORQUE ASSEMBLY ACCORDING TO MANUFACTURER'S SPECIFICATION.
3. ASSEMBLY TO FIT RAIL WEB OF 11,5mm TO 19mm.
4. DRILL Ø13,5mm HOLE IN RAIL WEB.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
5	TERMINAL LUG	AS REQ.	-	CEE-TU-0136
4	NUT, HEXAGON, STAINLESS STEEL TO SPEC AISI GRADE 316, M12	1	-	-
3	WEDGE LOCKING WASHER, STAINLESS STEEL TO SPEC AISI GRADE 304, M12	2	-	-
2	TINNED COPPER COLLAR WEDGE	2	-	-
1	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC AISI GRADE 304, M12 x 55.	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 1° ITEM NO : -
MATERIAL : -

VERSION INFO : QUATITY OF ITEM 3 CHANGED.

28/02/2024
APPROVED : W SCHOEMAN

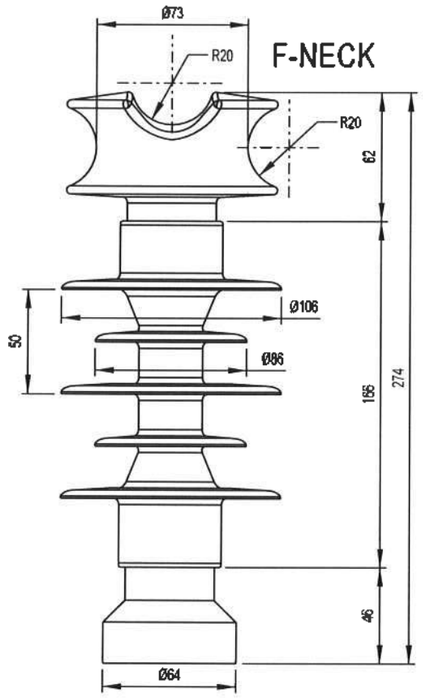
AUTHORISED : T GOVENDER

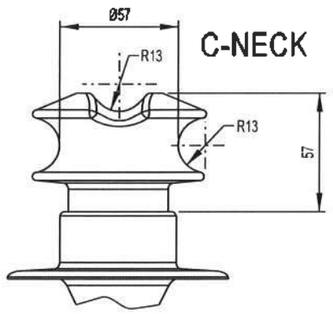
CONNECTION OF OHTE BONDS TO WEB OF RAIL

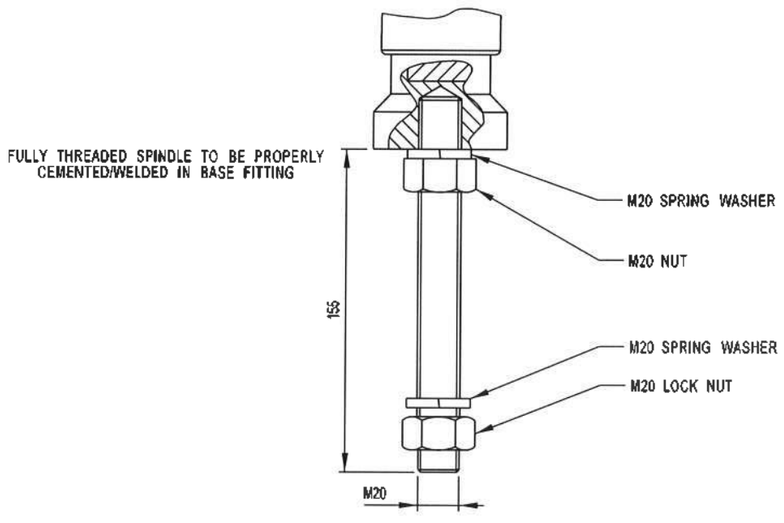
TRANSNET freight rail

BBC7864
VERSION 5 A3

DO REF: CDO/ E0471 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH







TECHNICAL DATA

SYSTEM VOLTAGE, Um	= 12kV
ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE, 50Hz, WET	= 50kV
LIGHTNING IMPULSE WITHSTAND VOLTAGE, 1,2/50, POS.	= 175kV
ARCING DISTANCE	= 186mm
MINIMUM CREEPAGE DISTANCE	= 392mm
SPECIFIED CANTILEVER LOAD (SCL)	= 15kN
MAXIMUM DESIGN CANTILEVER LOAD (MDCL)	= 5kN
NUMBER OF SMALL/LARGE SHEDS	= 2/3
MATERIAL OF BOTTOM FITTING	= STEEL, HOT DIP GALVANIZED TO SANS 121
WEIGHT (APPROX.)	= 3,5kg

DIMENSIONS : mm	SCALE : 1 : 2	DO REF : CDO/7883	DATE:
TOLERANCE : LIN ± 0,5 ANG ± -	ITEM NO : 54/024883	CP REF : BBF9102	APPROVED
MATERIAL : -		DRAWN : L S KEKANE	AUTHORISED
VERSION INFO : DRAWING REVISED.		DESIGNED : W MANS	
		CHECKED : J VAN DYK	

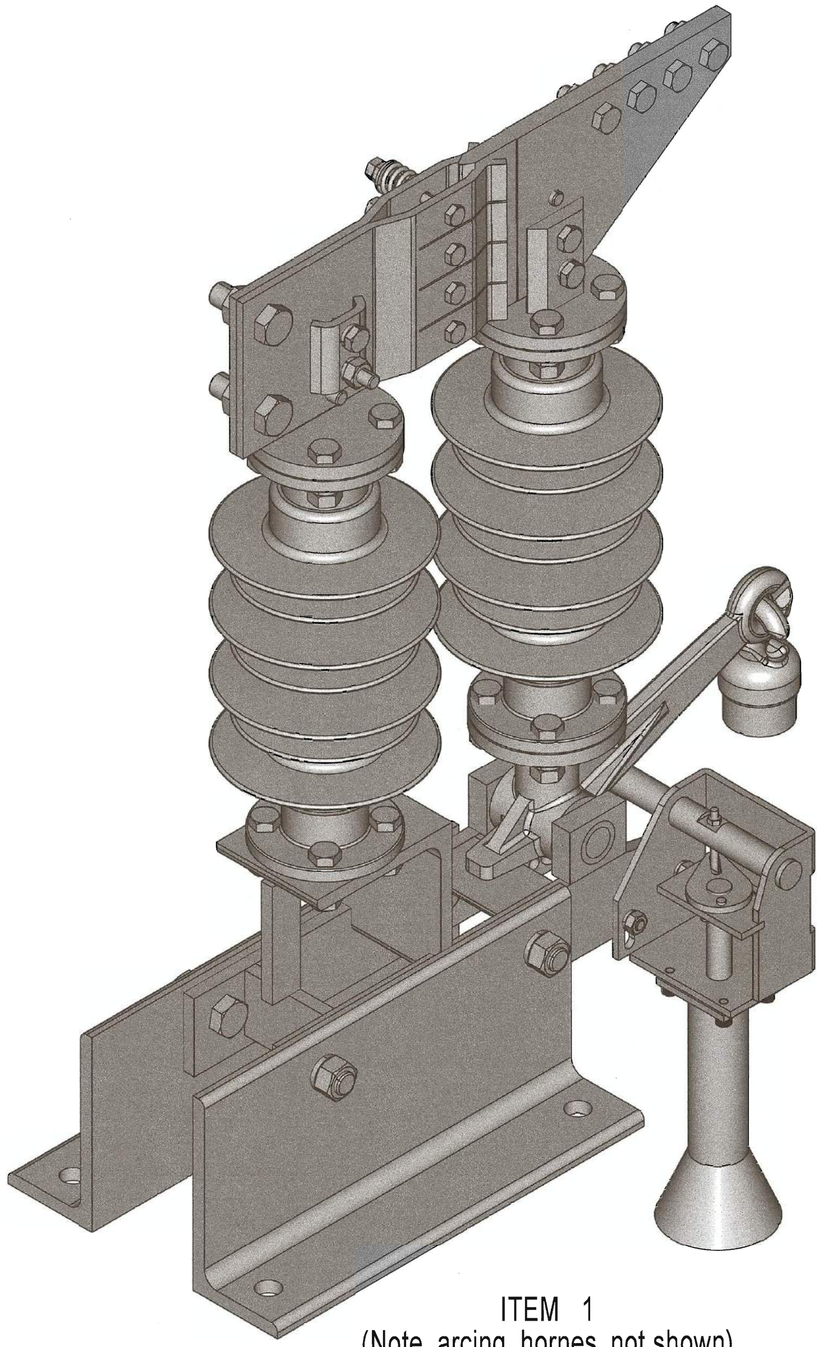
11kV AC VANDAL PROOF POST TRANSMISSION LINE INSULATOR.

TRANSNET freight rail

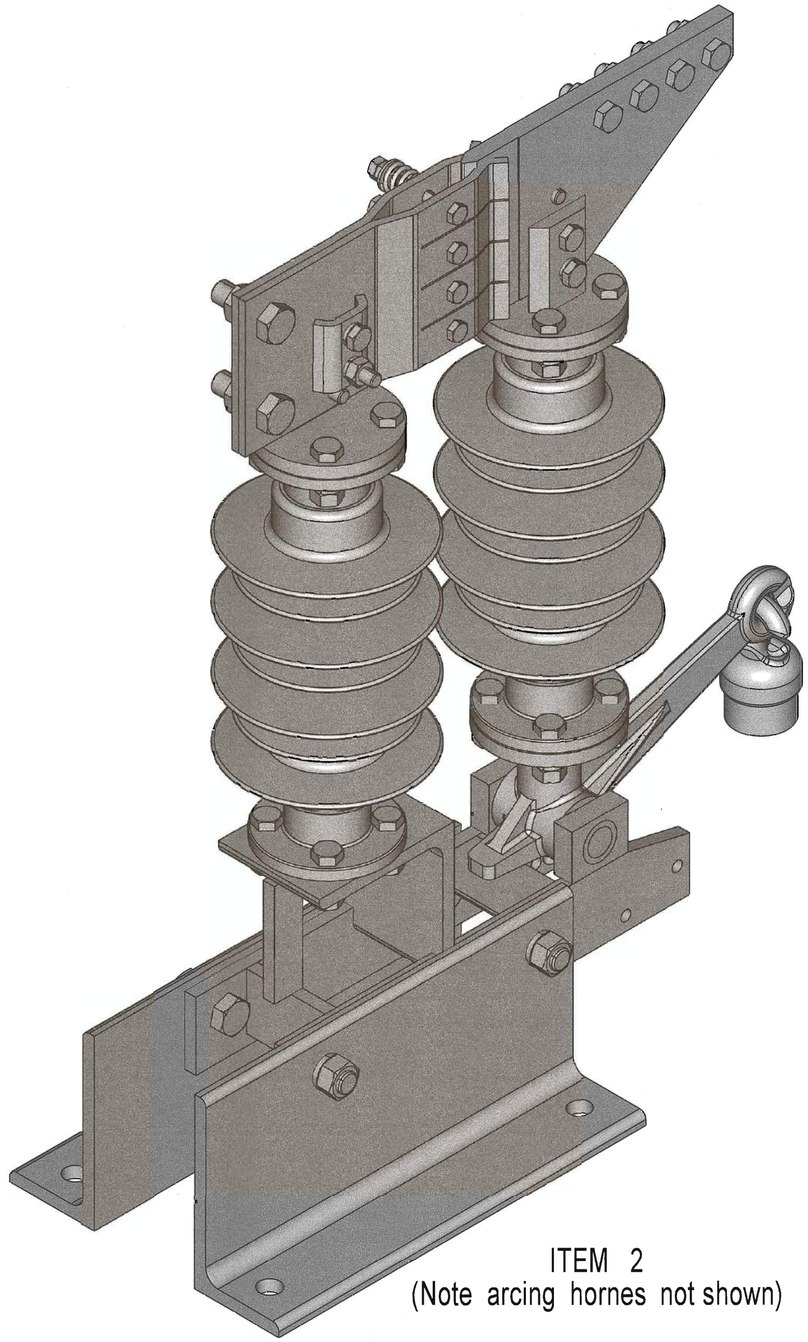
BBC8439

VERSION 2

A2



ITEM 1
(Note arcing hornes not shown)



ITEM 2
(Note arcing hornes not shown)

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	Track switch assembly without locking device	1	54005276	BBC8741 Sht. 2
1	Track switch assembly with locking device	1	54017397	BBC8741 Sht. 1

DIMENSIONS : mm SCALE : N.T.S.
TOLERANCE : LIN ± - ANG ± - ITEM NO : -
MATERIAL : -
VERSION INFO : -

DO REF : CDO/ 9144
ECP REF : -
DRAWN : D.A. Ballabio
DESIGNED : -
CHECKED : -

\+ 16/10/2018 APPROVED S. Smit

\+ 2018-10-16 AUTHORISED L. Borchard

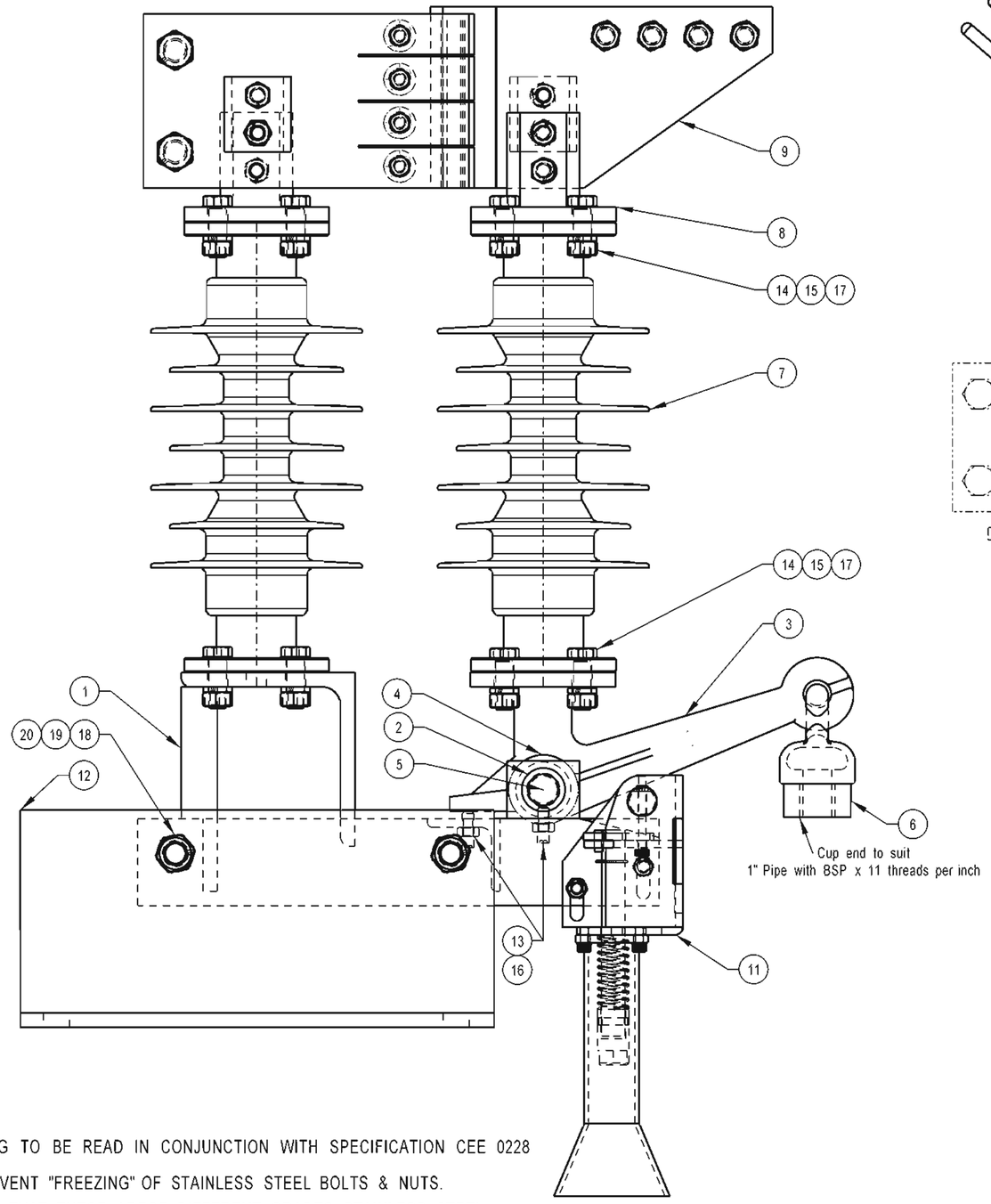
3kV DC TRACK SWITCH ASSEMBLY (WITH OR WITHOUT LOCKING DEVICE)

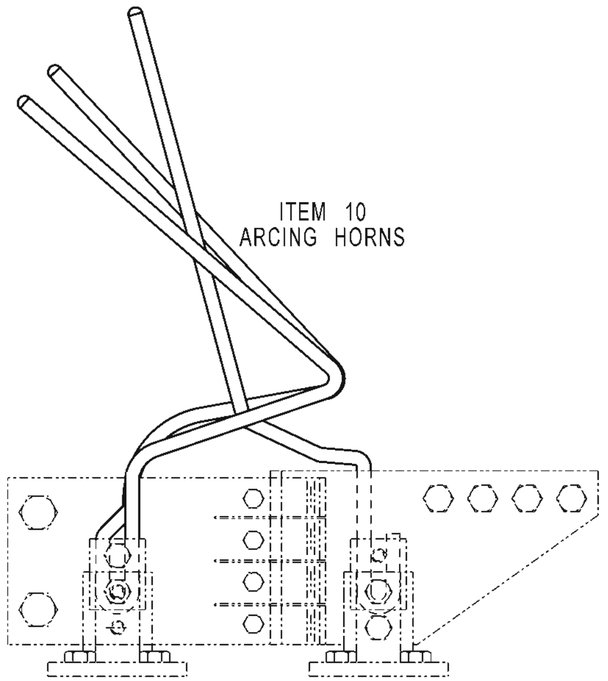
TRANSNET freight rail

BBC8741
VERSION 2

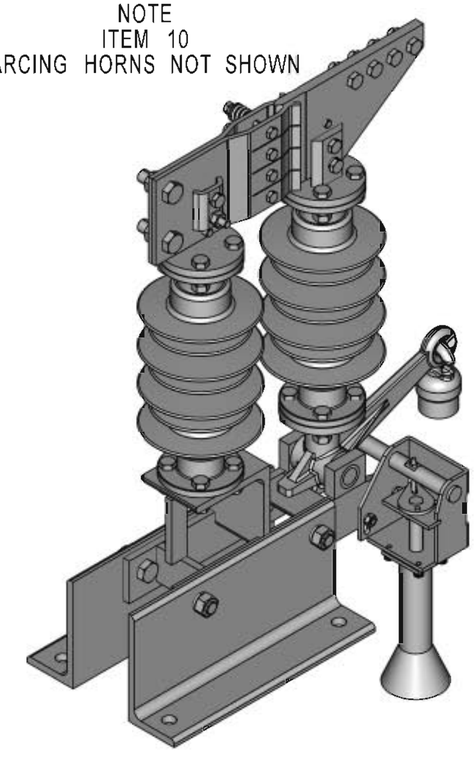
A2

NOTE
ITEM 10
ARCING HORNS NOT SHOWN





NOTE
ITEM 10
ARCING HORNS NOT SHOWN



NOTES

1. DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION CEE 0228
2. TO PREVENT "FREEZING" OF STAINLESS STEEL BOLTS & NUTS.
   ENSURE THAT THESE AREOF DIFFERENT GRADES STAINLESS STEEL
   (GRADE 304 FOR BOLTS AND GRADE 316 FOR NUTS)

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
20	Hexagon nut, Stainless steel Grade 316, M16	4	-	-
19	Spring lock washer, Square section, Single coil, Stainless steel, M16	4	-	-
18	Hexagon bolt, Stainless steel Grade 304, M16 x 40 long	4	-	-
17	Hexagon nut, Stainless steel Grade 316, M12	16	-	-
16	Hexagon nut, Stainless steel Grade 316, M8	2	-	-
15	Spring lock washer, Square section, Single coil, Stainless steel, M12	16	-	-
14	Hexagon bolt, Stainless steel Grade 304, M12 x 35 long	16	-	-
13	Hexagon socket set screw, Stainless steel Garde 304, M8 x 25 long (Grub screw)	2	-	-
12	Track switch mounting bracket set	1	-	BBG1593
11	Locking device assembly	1	-	BBB5971
10	Male & female arcing horns	1	-	-
9	Switch blade set	1	54023007	BBC8441
8	Switch blade attachment	2	-	-
7	Vandal proof post insulator	2	54033999	BBC8437
6	Switch blade operating rod lever cup	1	-	-
5	Switch blade operating rod lever shaft	1	-	-
4	Switch blade operating rod lever pivot spacer	2	-	-
3	Switch blade operating rod lever	1	-	-
2	Switch blade operating rod lever bush	2	-	-
1	Switch base assembly	1	-	BBD5769

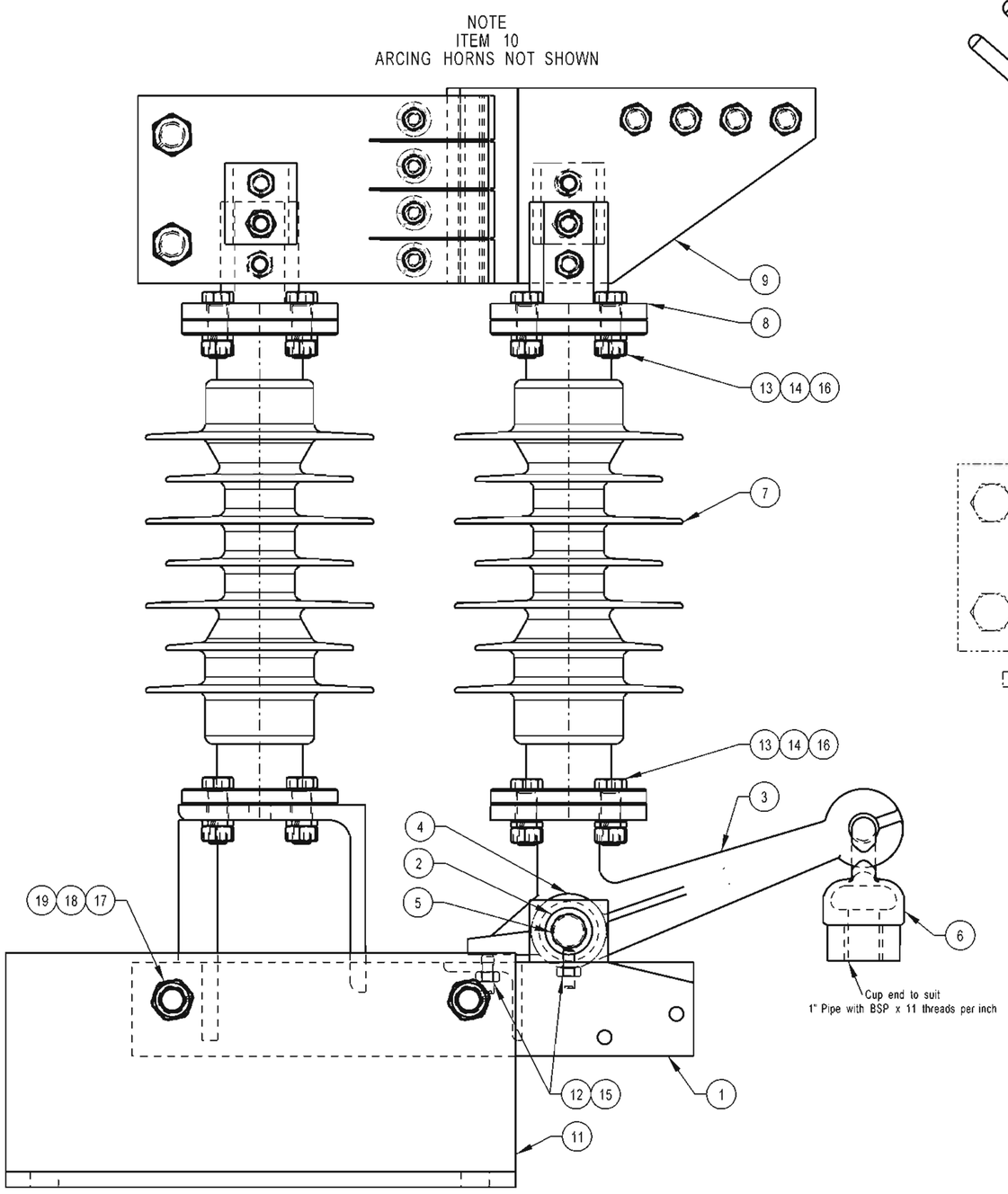
DIMENSIONS : mm SCALE : N.T.S.
TOLERANCE : LIN ± - ANG ± -
MATERIAL : -

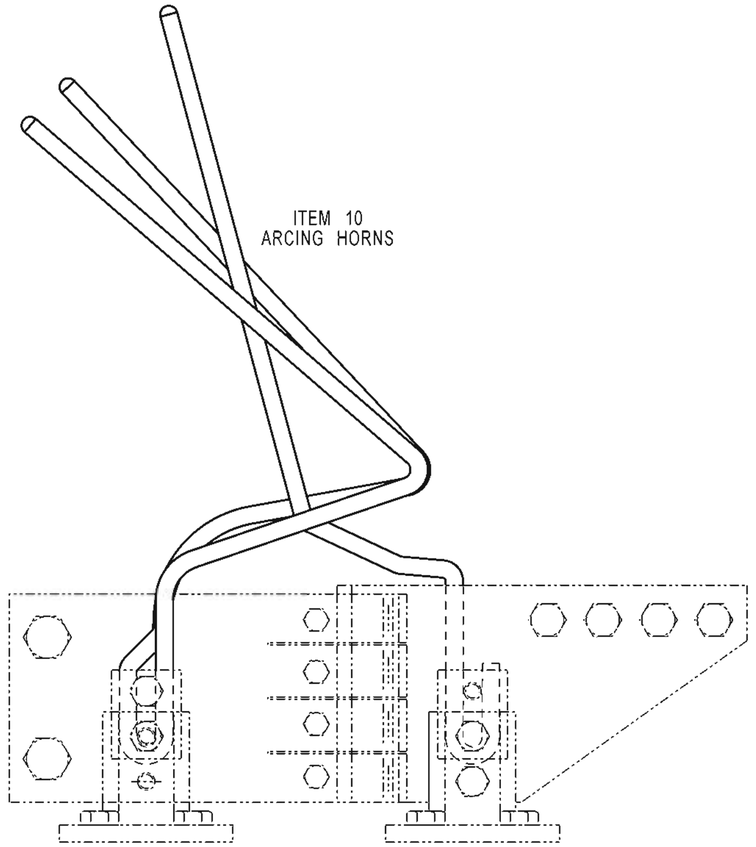
DRAWN : D.A. Ballabio CHECKED : -

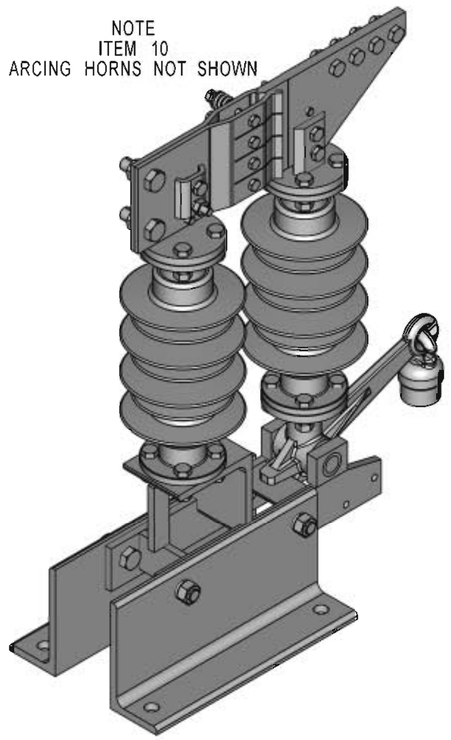
3kV DC TRACK SWITCH ASSEMBLY (WITH LOCKING DEVICE)

TRANSNET freight rail

BBC8741 Sht 1
VERSION 2
A2







ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
19	Hexagon nut, Stainless steel Grade 316, M16	4	-	-
18	Spring lock washer, Square section, Single coil, Stainless steel, M16	4	-	-
17	Hexagon bolt, Stainless steel Grade 304, M16 x 40 long	4	-	-
16	Hexagon nut, Stainless steel Grade 316, M12	16	-	-
15	Hexagon nut, Stainless steel Grade 316, M8	2	-	-
14	Spring lock washer, Square section, Single coil, Stainless steel, M12	16	-	-
13	Hexagon bolt, Stainless steel Grade 304, M12 x 35 long	16	-	-
12	Hexagon socket set screw, Stainless steel Garde 304, M8 x 25 long (Grub screw)	2	-	-
11	Track switch mounting bracket set	1	-	BBG1593
10	Male & female arcing horns	1	-	-
9	Switch blade set	1	54023007	BBC8441
8	Switch blade attachment	2	-	-
7	Vandal proof post insulator	2	54033999	BBC8437
6	Switch blade operating rod lever cup	1	-	-
5	Switch blade operating rod lever shaft	1	-	-
4	Switch blade operating rod lever pivot spacer	2	-	-
3	Switch blade operating rod lever	1	-	-
2	Switch blade operating rod lever bush	2	-	-
1	Switch base assembly	1	-	BBD5769

NOTES

1. DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION CEE 0228
2. TO PREVENT "FREEZING" OF STAINLESS STEEL BOLTS & NUTS. ENSURE THAT THESE AREOF DIFFERENT GRADES STAINLESS STEEL (GRADE 304 FOR BOLTS AND GRADE 316 FOR NUTS)

DIMENSIONS : mm SCALE : 1 : X
TOLERANCE : LIN ± XX ANG ± XX
MATERIAL : XXX

DRAWN : XXX CHECKED : XXX

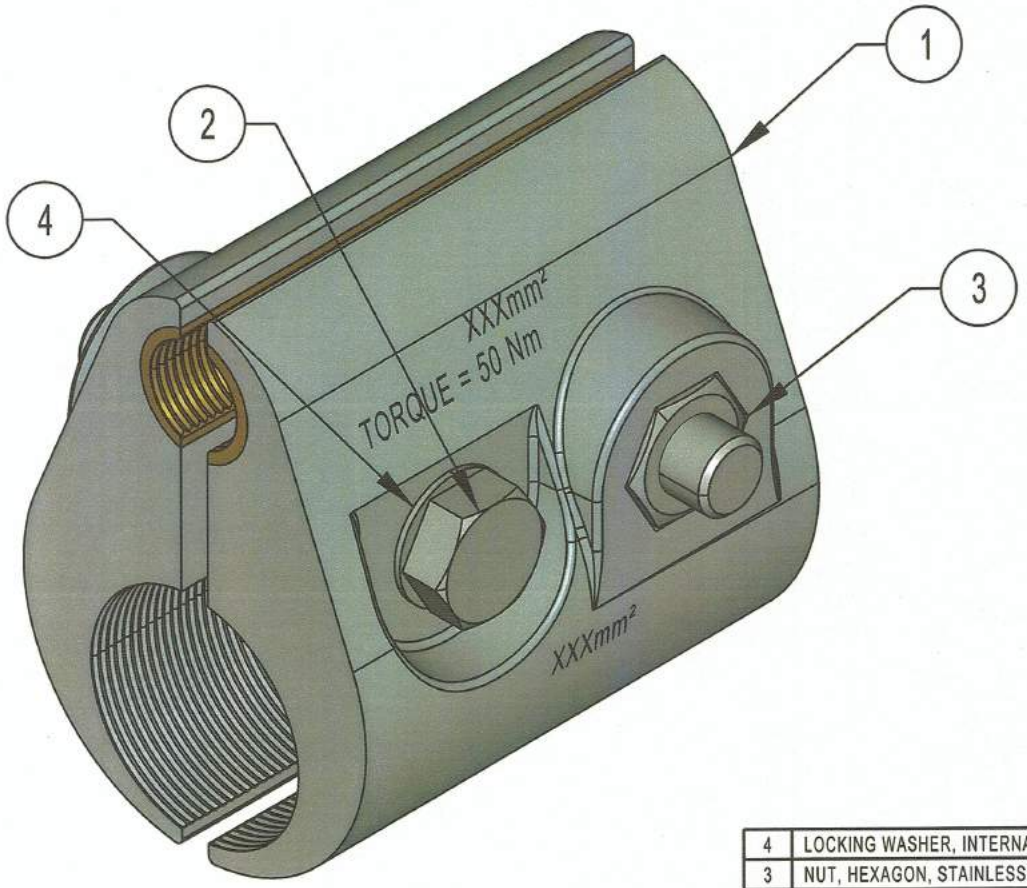
3kV DC TRACK SWITCH ASSEMBLY (WITHOUT LOCKING DEVICE)

TRANSNET freight rail

BBC8741 Sht 2

VERSION 2

A2



NOTES

1. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE		
CLAMP	BOLT LENGTH	STORES ITEM NO.
100mm² Al TO 160mm² Cu.	35mm	-
160mm² Al TO 50mm² Cu.	35mm	54032363
160mm² Al TO 100mm² / 80mm² Cu.	35mm	54032375
160mm² Al TO 160mm² Cu.	35mm	54032387
250mm² Al TO 160mm² Cu.	40mm	-
500mm² Al TO 160mm² Cu.	60mm	54016937
800mm² Al TO 160mm² Cu.	65mm	54016925

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
4	LOCKING WASHER, INTERNALLY TOOTHED, STAINLESS STEEL TO SPEC AISI GR 304, M12	2	-	-
3	NUT, HEXAGON, STAINLESS STEEL TO SPEC CEE0063, M12	2	-	-
2	BOLT, HEXAGON, STAINLESS STEEL TO SPEC CEE 0063, M12 (SEE TABLE)	2	-	-
1	BI-METAL PARALLEL HALF CLAMP FOR 160mm² Al TO VARIOUS Cu. CONDUCTORS.	2	-	BBD5138 SHT 5
	BI-METAL PARALLEL HALF CLAMP FOR 800mm² Al TO 160mm² Cu.	2	-	BBD5138 SHT 4
	BI-METAL PARALLEL HALF CLAMP FOR 500mm² Al TO 160mm² Cu.	2	-	BBD5138 SHT 3
	BI-METAL PARALLEL HALF CLAMP FOR 250mm² Al TO 160mm² Cu.	2	-	BBD5138 SHT 2
	BI-METAL PARALLEL HALF CLAMP FOR 100mm² Al TO 160mm² Cu.	2	-	BBD5138 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG±- ITEM NO : -
MATERIAL : -

VERSION INFO : REDRAWN AND NOTES ADDED

2019-08-15
APPROVED: S SMIT

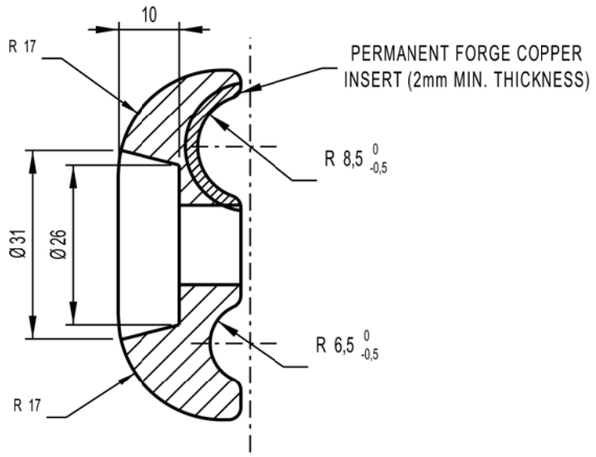
2019-08-15
AUTHORISED: L O BORCHARD

BI-METALLIC PARALLEL CLAMP ASSEMBLY, Al. CLAMP BODY WITH FORGED Cu. INSERT.

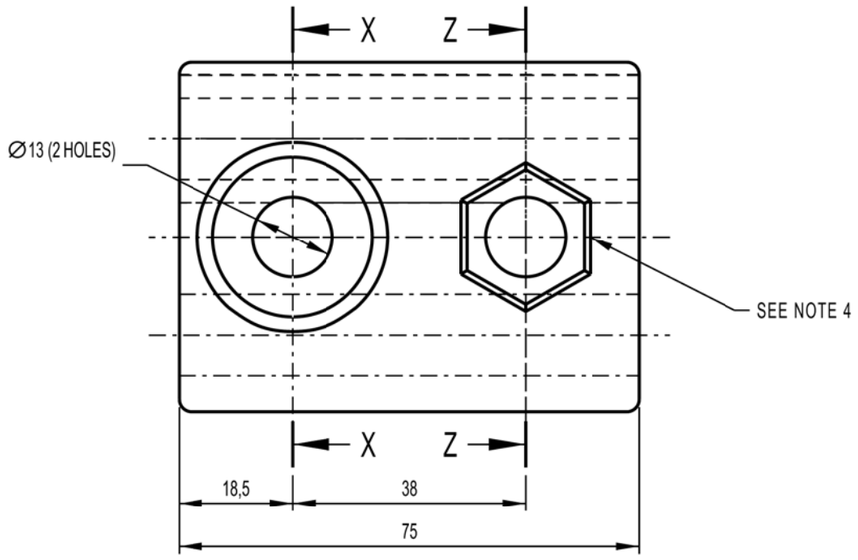
TRANSNET freight rail

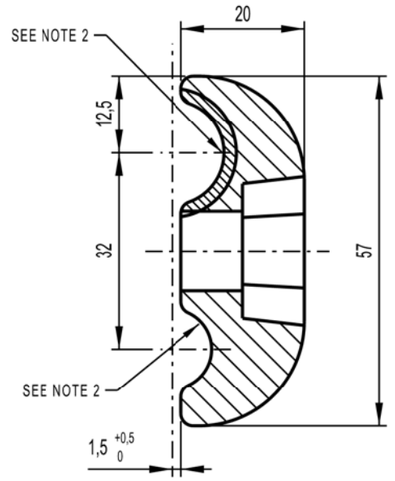
BBD5138
VERSION 3
A4

DO REF: CDO/ 9412 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH



SECTION X-X

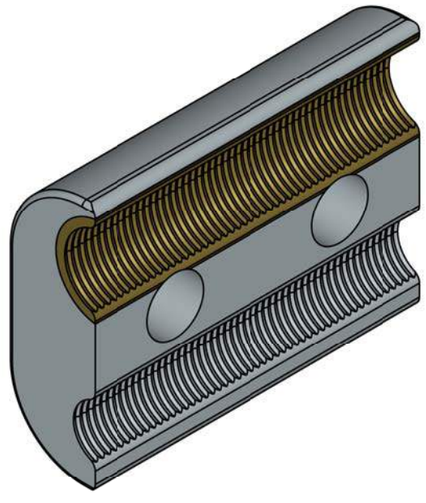


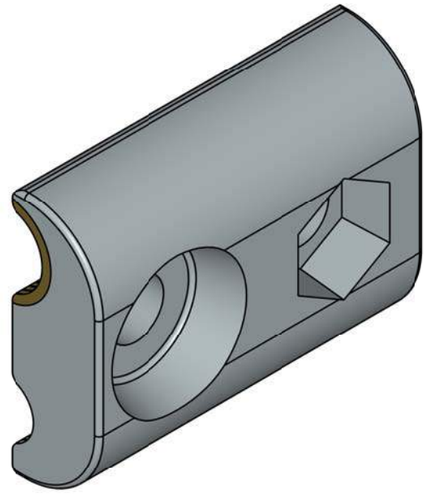


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBD5138.
6. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	268A
5 MIN.	292A
1 MIN.	484A



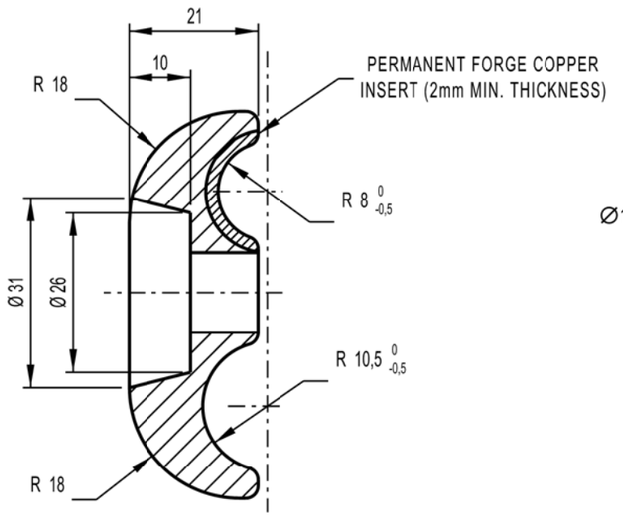


DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN± 1 ANG± -		
MATERIAL	: ALUMINIUM ALLOY WITH PERMANENT FORGED COPPER INSERT TO SPEC CEE 0063.		
DRAWN	: D HATTINGH	CHECKED	: D HATTINGH

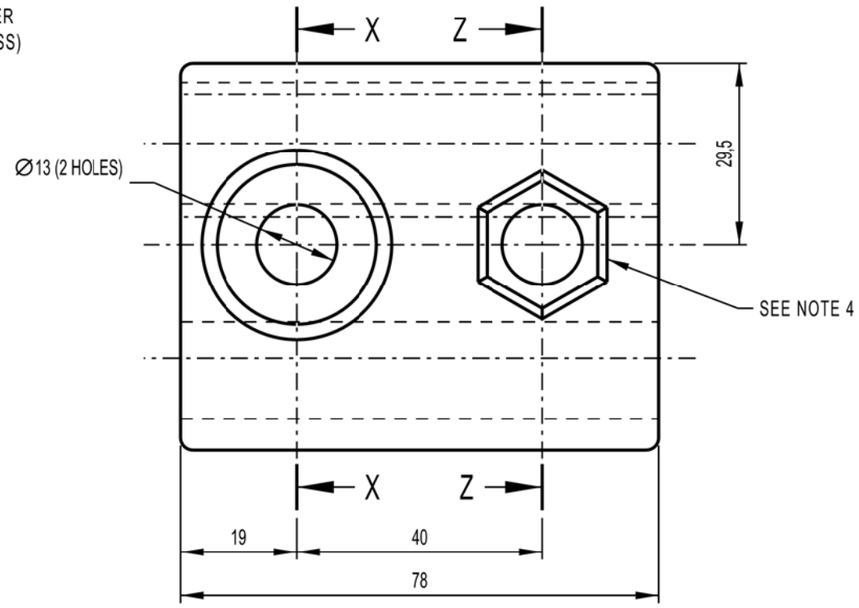
BI-METALLIC PARALLEL HALF CLAMP
100mm² ACSR 'SKUNK' CATENARY
TO 160mm² Cu.

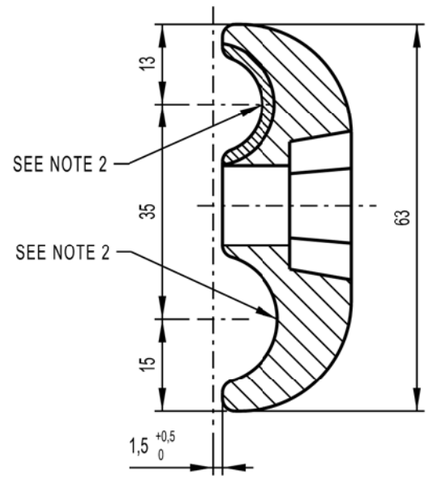
TRANSNET freight rail

BBD5138 SHT 1
VERSION 3 A3



SECTION X-X

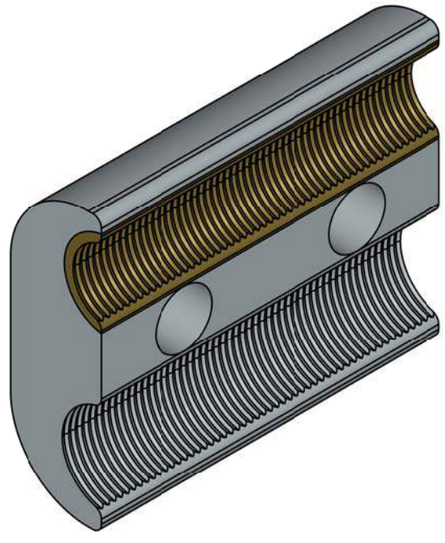


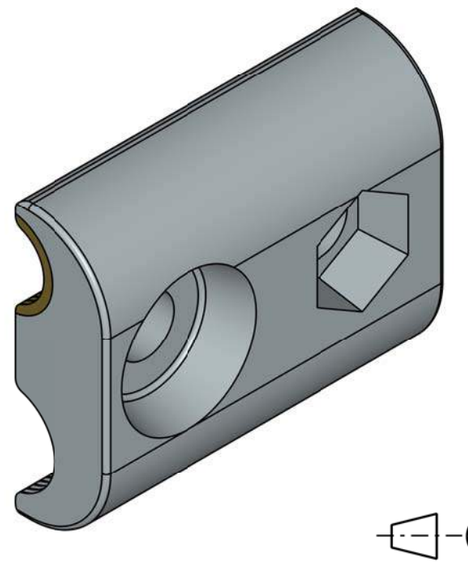


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBD5138.
6. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	571A
5 MIN.	922A
1 MIN.	1881A



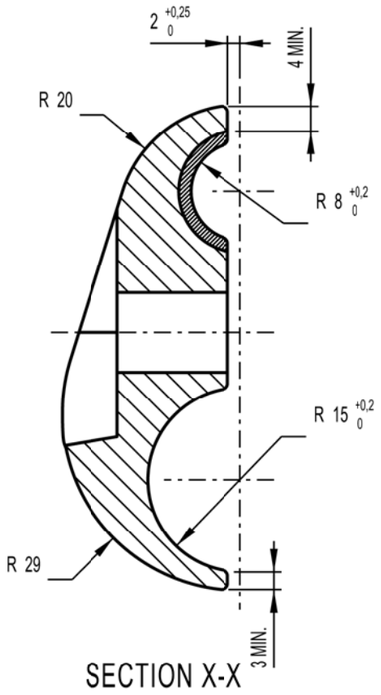


DIMENSIONS	: mm SCALE : 1 : 1
TOLERANCE	: LIN± 1 ANG± -
MATERIAL	: ALUMINIUM ALLOY WITH PERMANENT FORGED COPPER INSERT TO SPEC CEE 0063.
DRAWN	: D HATTINGH CHECKED : D HATTINGH

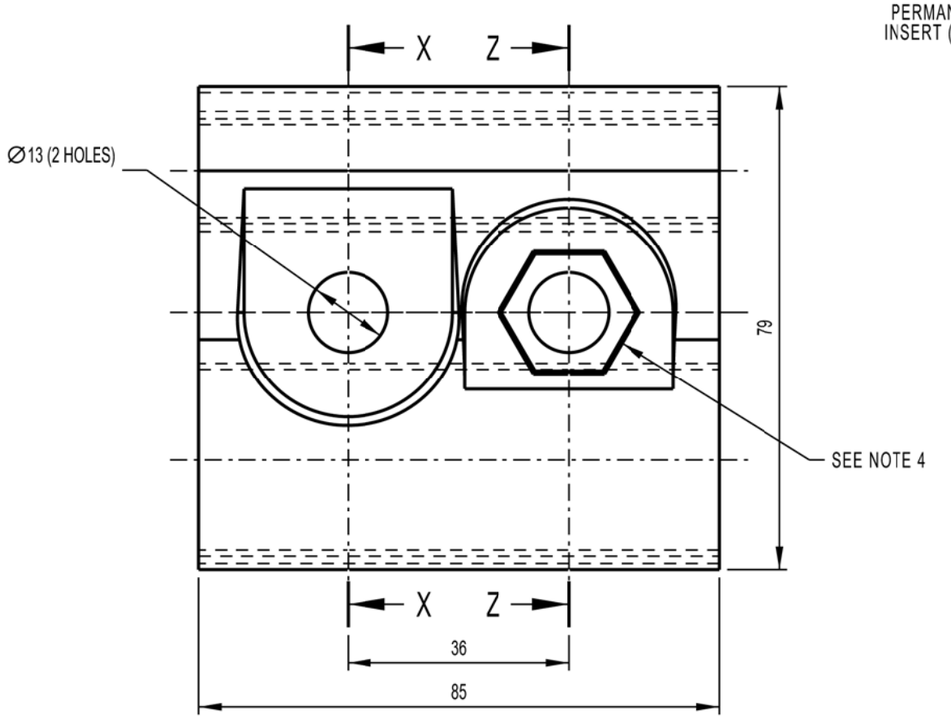
BI-METALLIC PARALLEL HALF CLAMP
250mm² Al FEEDER TO 160mm² Cu.

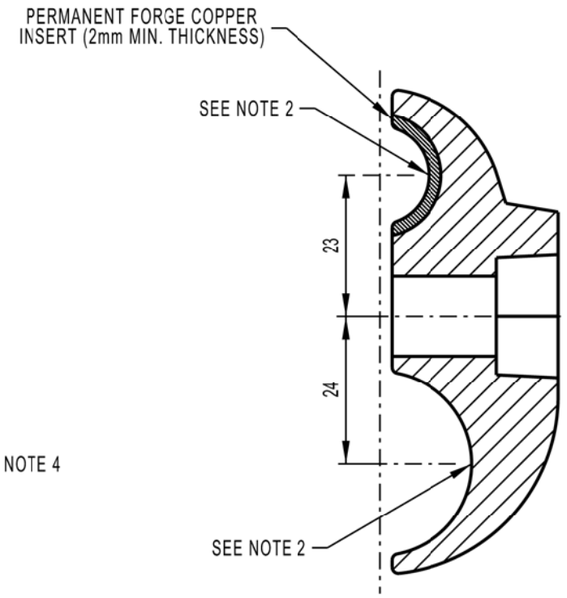
TRANSNET freight rail

BBD5138 SHT 2
VERSION 3 A3



SECTION X-X

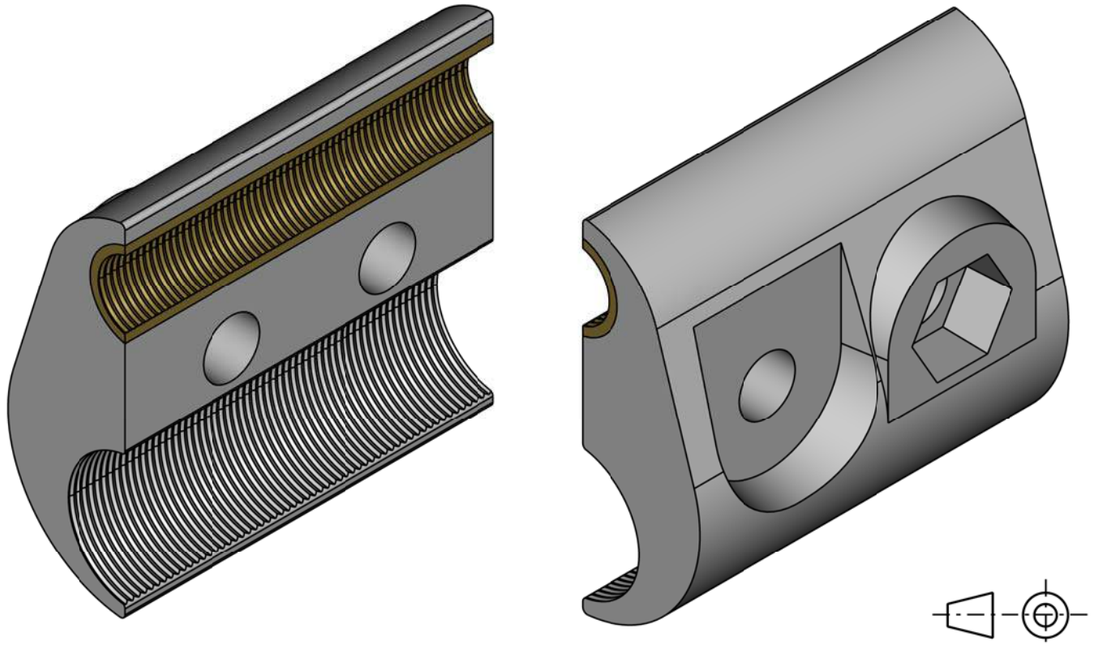




SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 BOLT.
5. FOR ASSEMBLY, SEE DRAWING BBD5138.
6. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	1631A
5 MIN.	3733A
1 MIN.	8008A



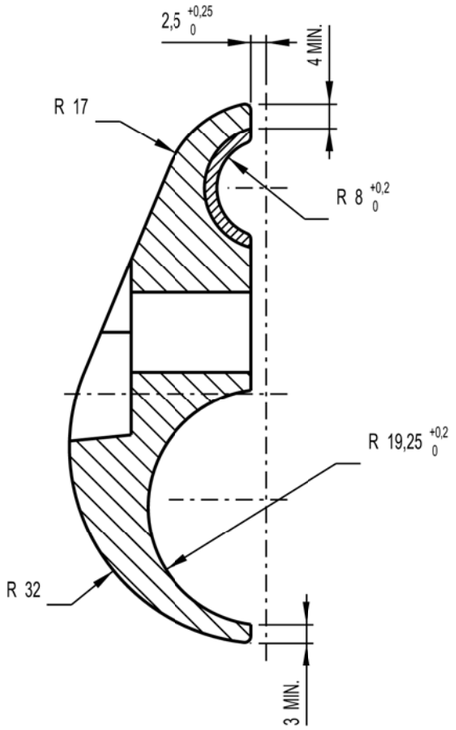
DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN± 1 ANG± -		
MATERIAL	: ALUMINIUM ALLOY WITH PERMANENT FORGED COPPER INSERT TO SPEC CEE 0063.		
DRAWN	: D HATTINGH	CHECKED	: D HATTINGH

BI-METALLIC PARALLEL HALF CLAMP
500mm² Al FEEDER TO 160mm² Cu.

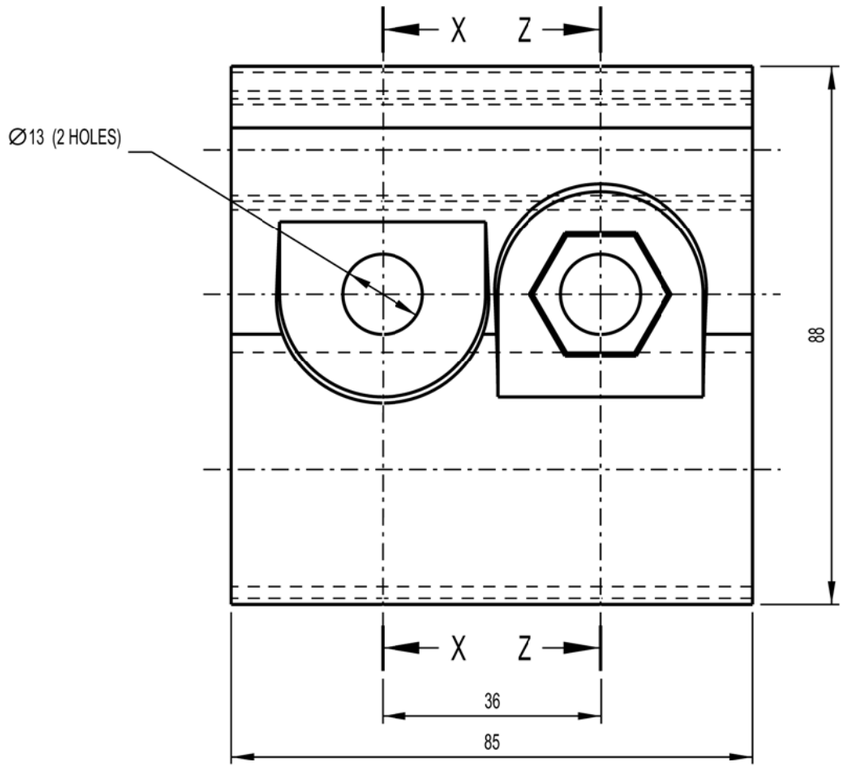
TRANSNET freight rail

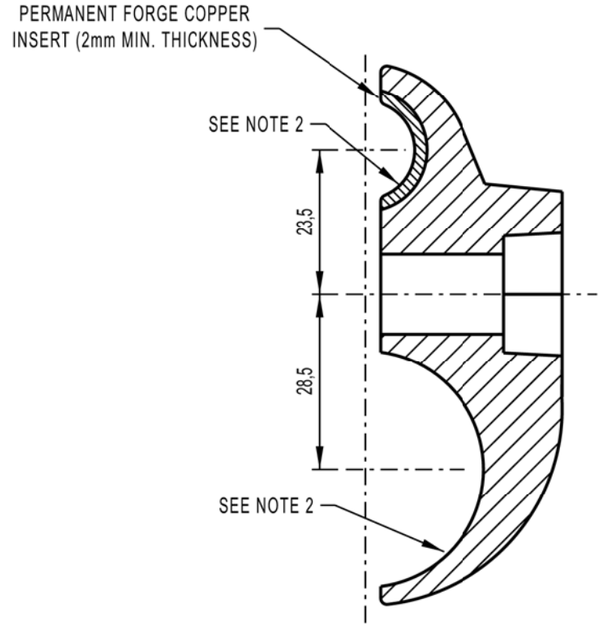
BBD5138 SHT 3

VERSION 3 A3

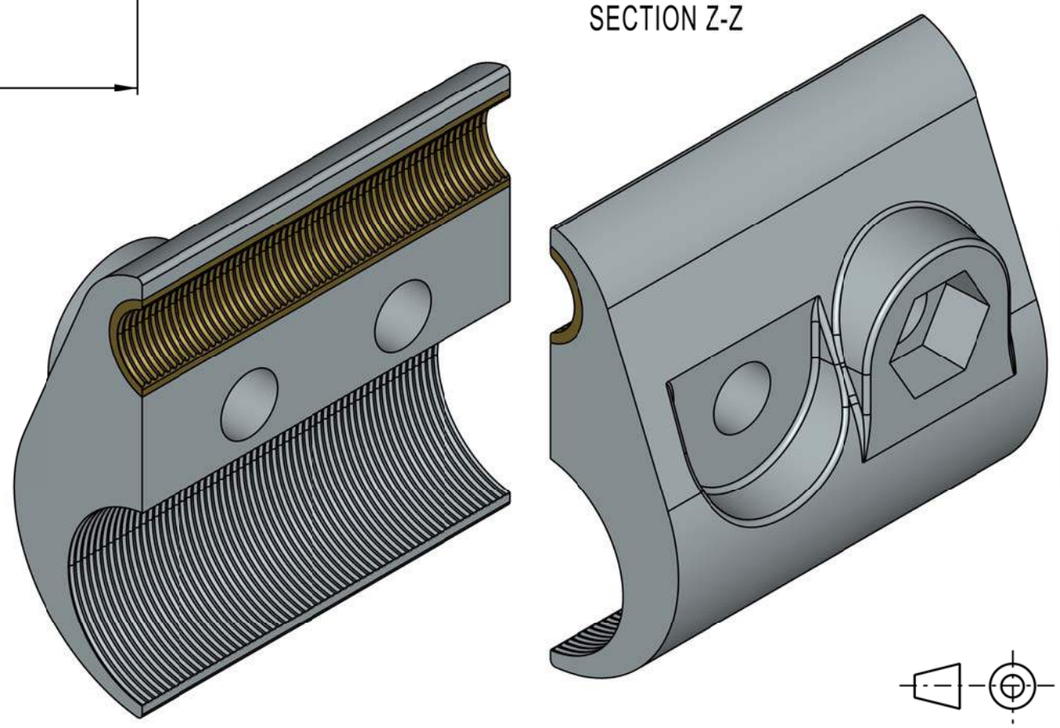


SECTION X-X





SECTION Z-Z



NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBD5138.
6. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	1631A
5 MIN.	3733A
1 MIN.	8008A

DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN± 1 ANG± -		
MATERIAL	: ALUMINIUM ALLOY WITH PERMANENT FORGED COPPER INSERT TO SPEC CEE 0063.		
DRAWN	: D HATTINGH	CHECKED	: D HATTINGH

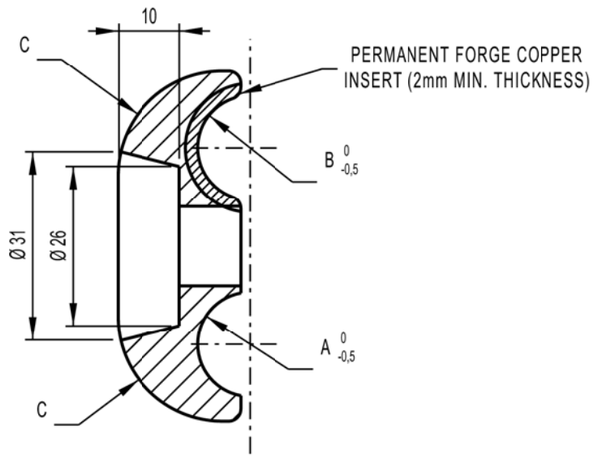
BI-METALLIC PARALLEL HALF CLAMP
800mm² Al FEEDER TO 160mm² Cu.

TRANSNET freight rail

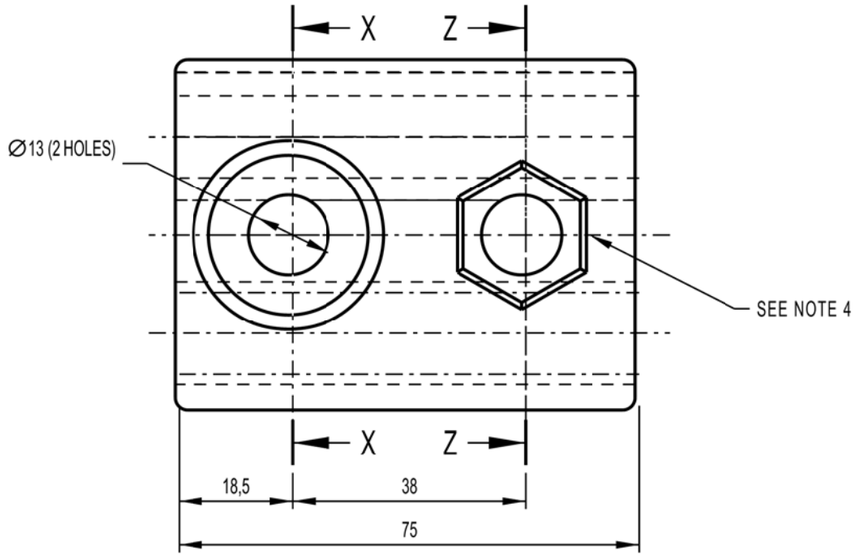
BBD5138 SHT 4

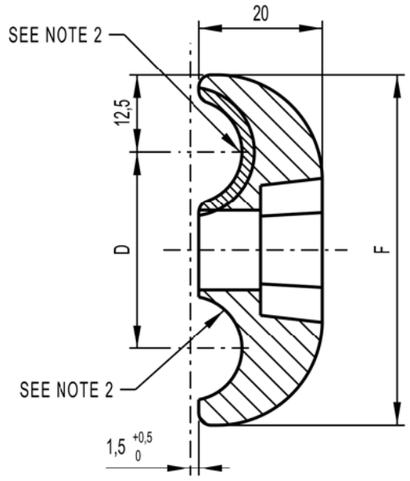
VERSION 3 A3

STORES ITEM NUMBER	CONDUCTOR SIZES	DIMENSIONS					
		A	B	C	D	E	F
54032363	160mm² Al. - 50mm² Cu.	8,5 $^{0}_{-0,5}$	4,5 $^{0}_{-0,5}$	17	28	20.5	49
54032375	160mm² Al. - 100mm² / 80mm² Cu.	8,5 $^{0}_{-0,5}$	6,5 $^{0}_{-0,5}$	17	30	24.5	53
54032387	160mm² Al. - 160mm² Cu.	8,5 $^{0}_{-0,5}$	8,5 $^{0}_{-0,5}$	17	32	28.5	57



SECTION X-X

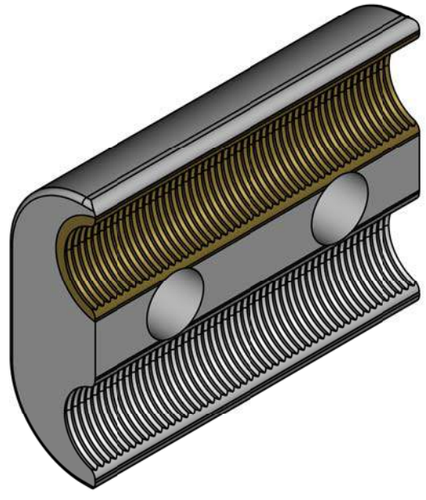


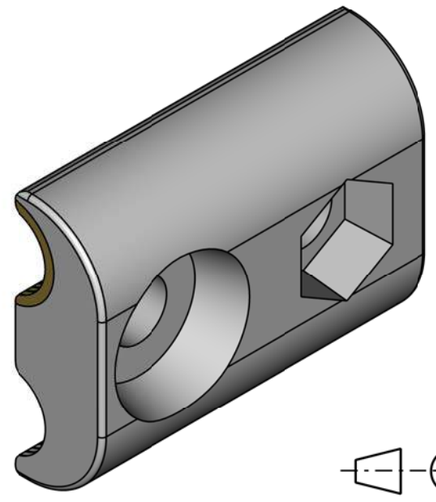


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBD5138.
6. BI-METAL CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	403A
5 MIN.	527A
1 MIN.	1000A





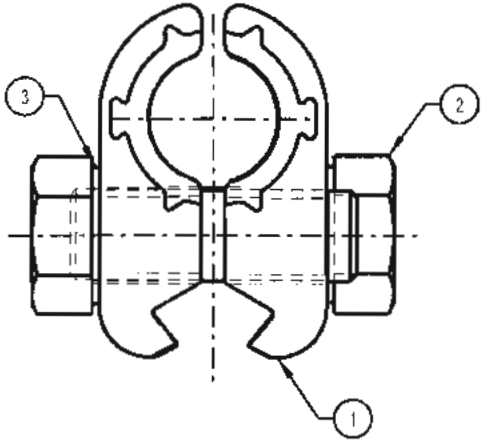
DIMENSIONS	: mm	SCALE : 1 : 1
TOLERANCE	: LIN± 1 ANG± -	
MATERIAL	: ALUMINIUM ALLOY WITH PERMANENT FORGED COPPER INSERT TO SPEC CEE 0063.	
DRAWN	: D HATTINGH	CHECKED : D HATTINGH

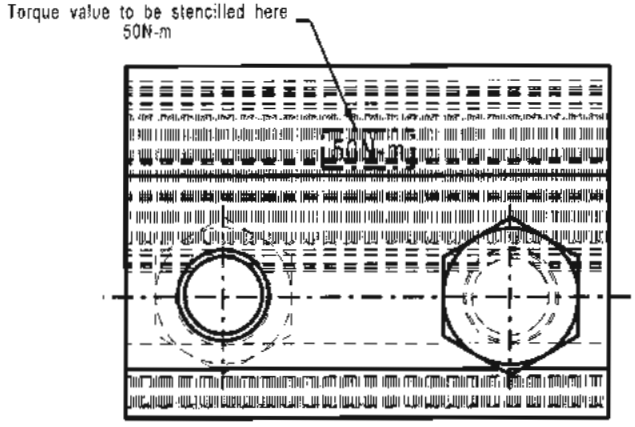
BI-METALLIC PARALLEL HALF CLAMP
160mm² ACSR 'TIGER' CATENARY TO VARIOUS Cu. CONDUCTORS

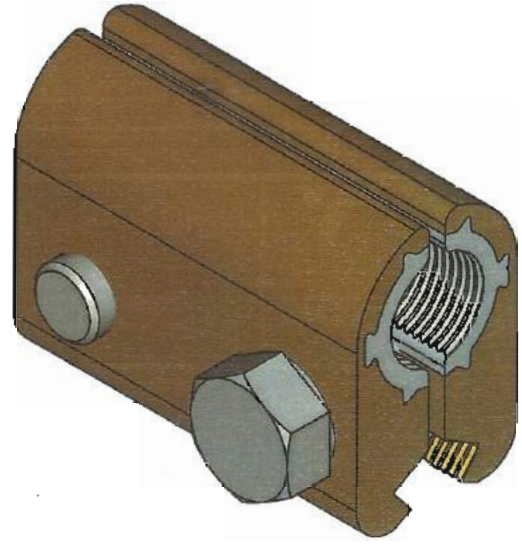
TRANSNET freight rail

BBD5138 SHT 5

VERSION 3 A3







Note
1. Bi-metal feeder clamp to specification CEE-0063
2. The following permanent markings must appear on this article.
   a) Transnet Logo.
   b) Manufacturers identification.
   c) Dated batch number.
   d) Wire size.
   e) Torque value.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	Lock washer. Internally toothed. Stainless steel to Spec. AISI GR 304. M12	2	-	-
2	Machine screw, Stainless steel to spec. AISI GR 304. Hex head, M12 x 35 long	2	-	-
1	Feeder half clamp	2	-	BBG6147 Sht 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN - ANG - ITEM NO: 54000401
MATERIAL : -
VERSION INFO : Notes and slots added.

+ 14/03/2019
APPROVED: S Smit

+ 14-3-2019
AUTHORISED: L O Borchard

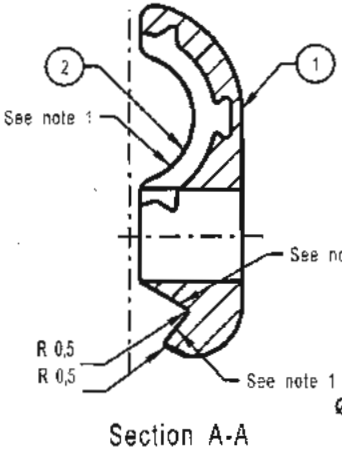
BI-METAL FEEDER CLAMP FOR 160mm² Al / 161mm² Cu CONTACT WIRE

TRANSNET freight rail

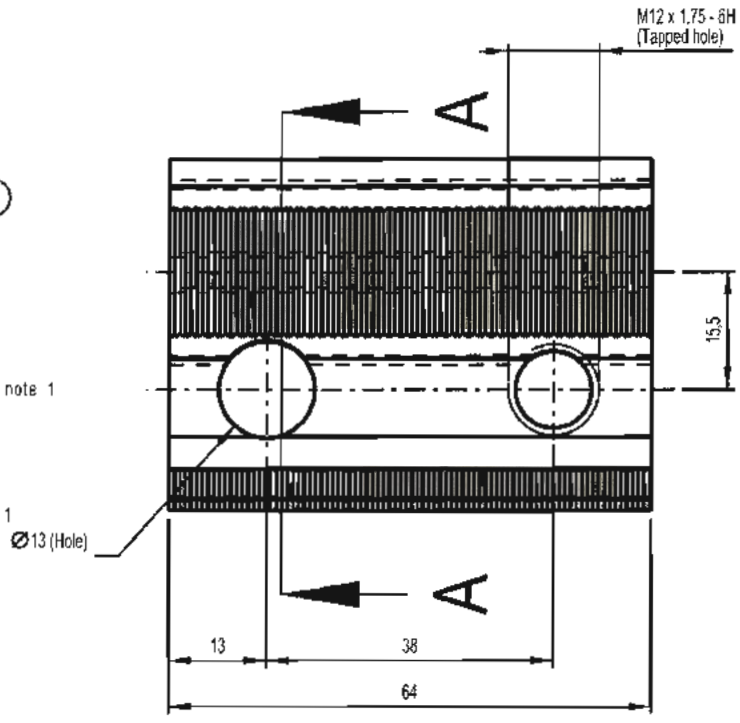
BBG6147
VERSION 5

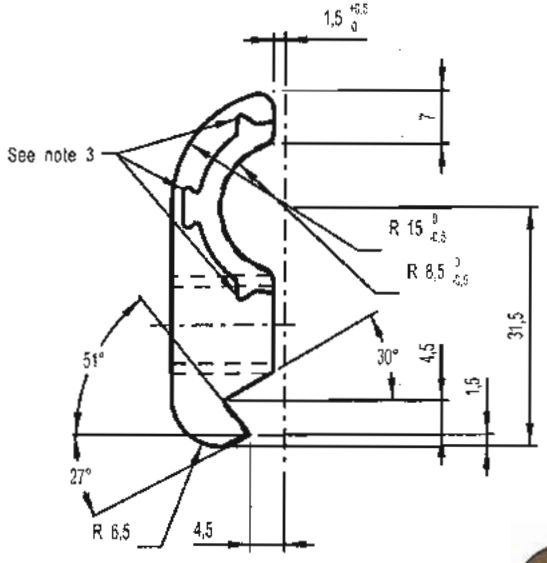
A4

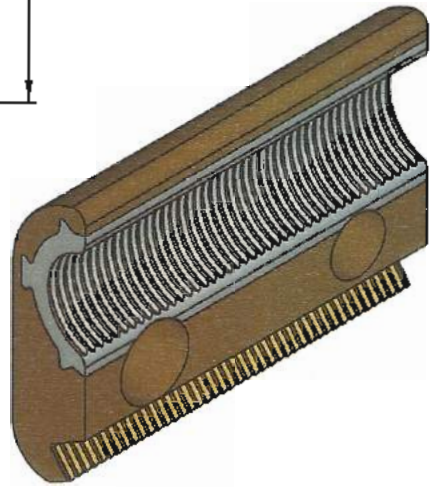
DO REF. CDO/9331 ECP REF: - DRAWN: D Hattingh DESIGNED. - CHECKED. D Hattingh



Section A-A







Notes.

1. These surfaces to be serated; 1.5 pitch x 0.3 deep.
2. All unspecified radii R2.
3. Slots in Cu-Ni-Si half clamp to prevent forcable removal of Aluminium liner after forging

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	Permanently Forged Aluminium Grade 6063 insert, 3mm thick	1	-	-
1	CU-Ni-Si Alloy to Spec. CEE-0063	1	-	-

DIMENSIONS mm SCALE : 1 : 1
TOLERANCE LIN± 0.5 ANG± 0°30'
MATERIAL
VERSION : Notes and slots added.
INFO

DRAWN : D Hattingh CHECKED : D Hattingh

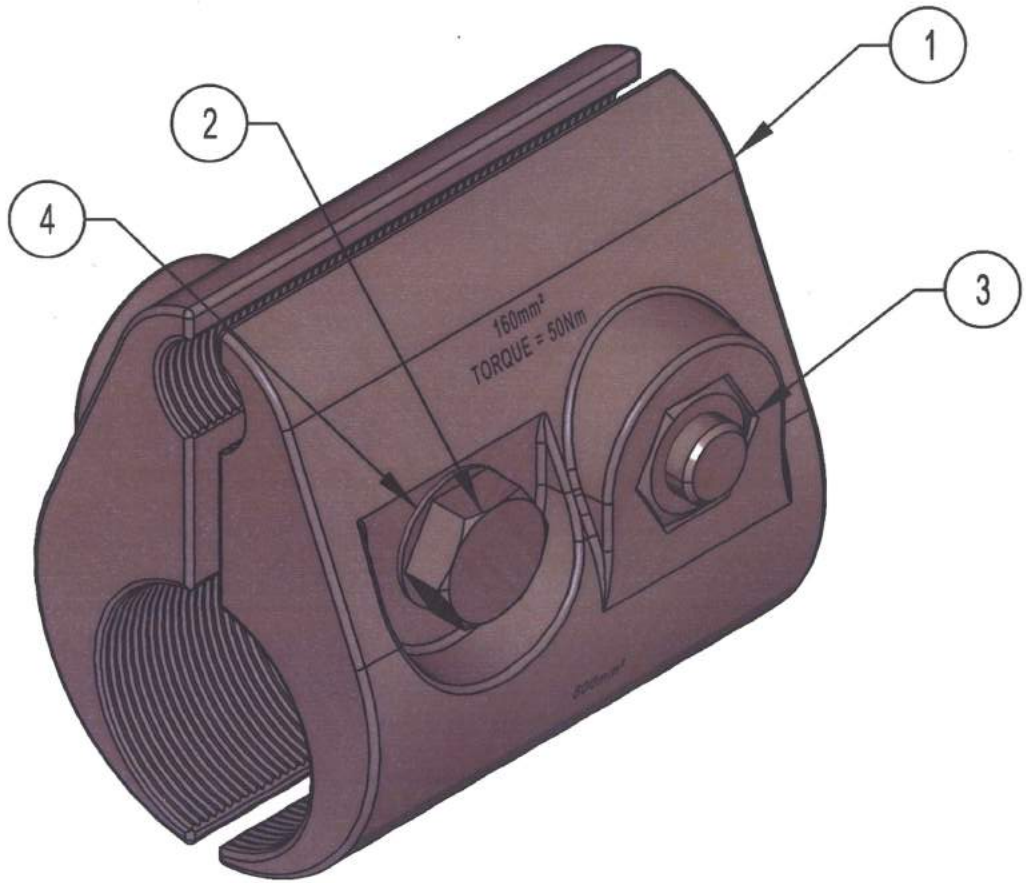
BI-METAL FEEDER HALF CLAMP FOR 160mm² Al. / 161mm² Cu. CONTACT WIRE

TRANSNET freight rail

BBG6147 Sht 1

VERSION 5 A4

STORES ITEM NO.	ALUMINIUM CONDUCTOR SIZES
54032504	160mm² TO 160mm²
54000560	500mm² TO 160mm²
54000603	800mm² TO 160mm²



NOTES
1. CLAMP TO SPECIFICATION CEE 0063.
2. CLAMP TO BE SUPPLIED AS A COMPLETE ASSEMBLY.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
4	LOCKING WASHER, INTERNALLY TOOTHED, STAINLESS STEEL TO SPEC AISI GR 304, M12	2	-	-
3	NUT, HEXAGON, STAINLESS STEEL TO SPEC CEE0063, M12	2	-	-
2	BOLT, HEXAGON, STAINLESS STEEL TO SPEC CEE 0063, M12	2	-	-
1	PARALLEL HALF CLAMP FOR 800mm² Al TO 160mm² Al.	2	-	BBD5138 SHT 3
	PARALLEL HALF CLAMP FOR 500mm² Al TO 160mm² Al.	2	-	BBD5138 SHT 2
	PARALLEL HALF CLAMP FOR 160mm² Al TO 160mm² Al.	2	-	BBD5138 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG±- ITEM NO : -
MATERIAL : -

VERSION INFO : DESCRIPTION CHANGED.

2020-1-28
APPROVED: S SMIT

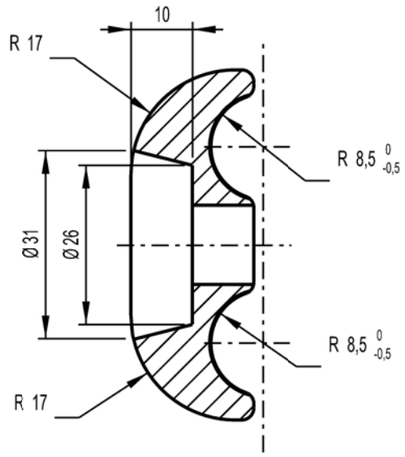
2020-01-28
AUTHORISED: L O BORCHARD

ALUMINIUM PARALLEL CLAMP ASSEMBLY

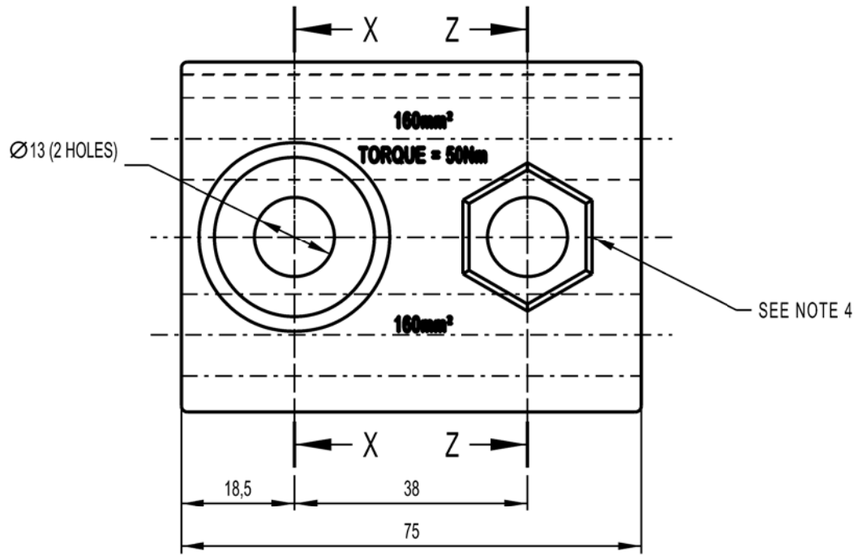
TRANSNET freight rail

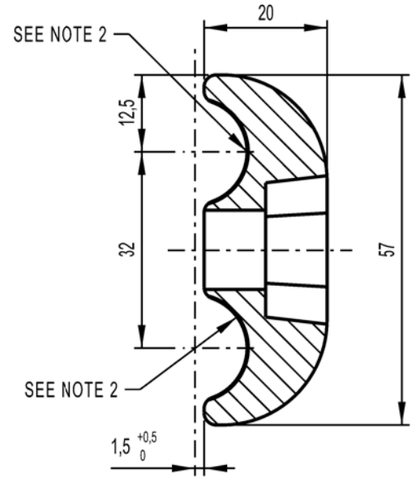
BBG7987
VERSION 4
A4

DO REF: CDO/ 9339 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH



SECTION X-X

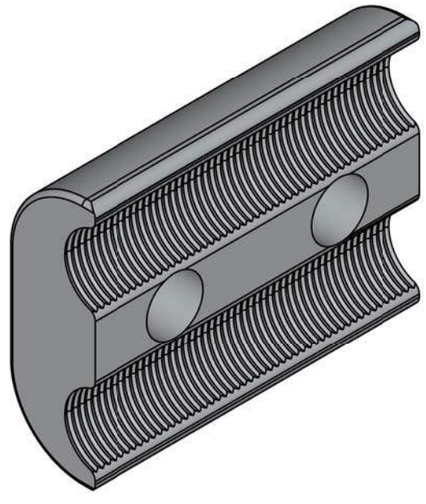


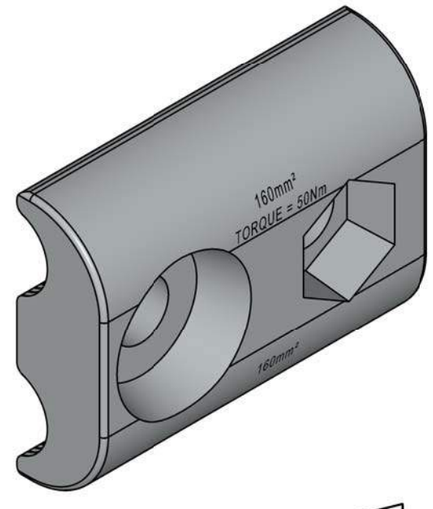


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBG7987.
6. ALUMINIUM CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	1140A
5 MIN.	1840A
1 MIN.	3760A





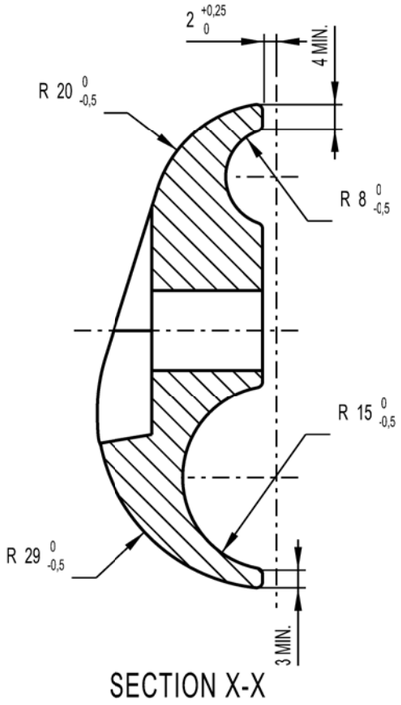
DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 1 ANG± -
MATERIAL : ALUMINIUM, GRADE 6063 TO SPEC CEE 0063.

DRAWN : D HATTINGH CHECKED : D HATTINGH

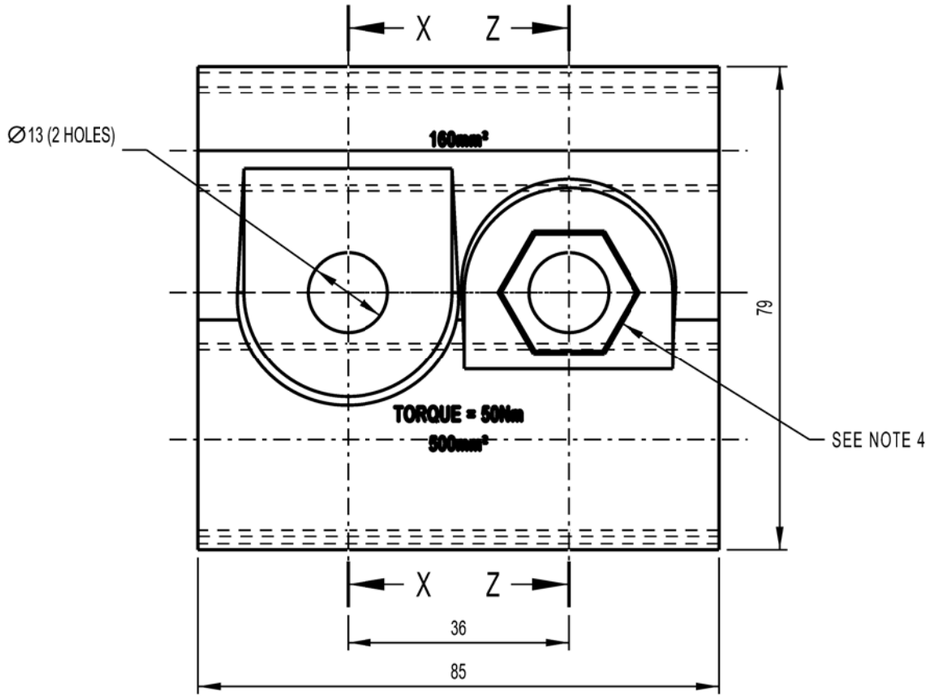
ALUMINIUM PARALLEL HALF CLAMP
160mm² TO 160mm² Al.
TIGER CATENARY

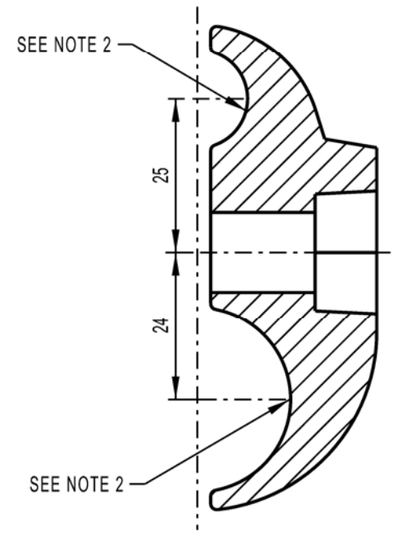
TRANSNET freight rail

BBG7987 SHT 1
VERSION 4 A3



SECTION X-X

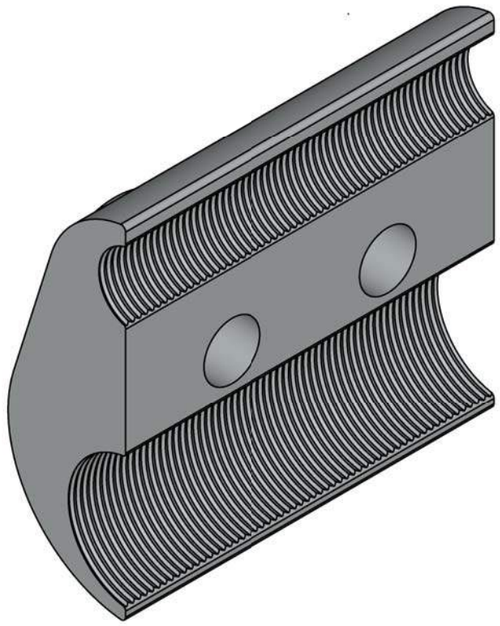


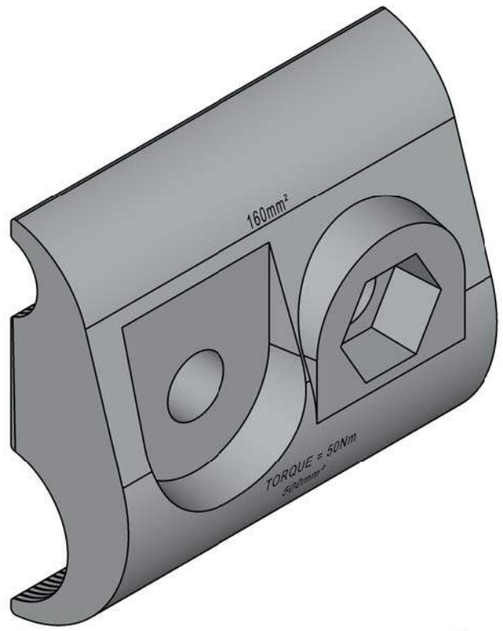


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBG7987.
6. ALUMINIUM CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	1140A
5 MIN.	1840A
1 MIN.	3760A



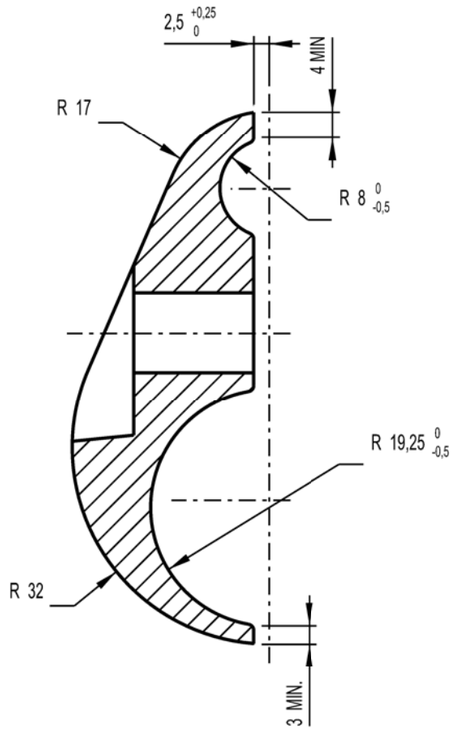


DIMENSIONS	: mm SCALE : 1 : 1
TOLERANCE	: LIN± 1 ANG± -
MATERIAL	: ALUMINIUM, GRADE 6063 TO SPEC CEE 0063.
DRAWN	: D HATTINGH CHECKED : D HATTINGH

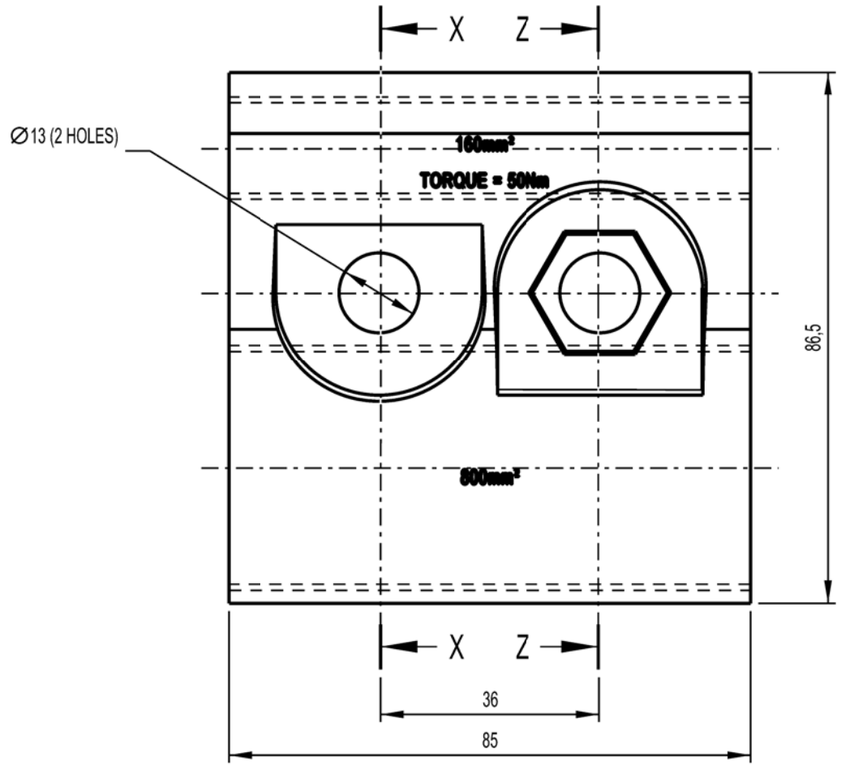
ALUMINIUM PARALLEL HALF CLAMP
500mm² ALUMINIUM TO 160mm² ALUMINIUM

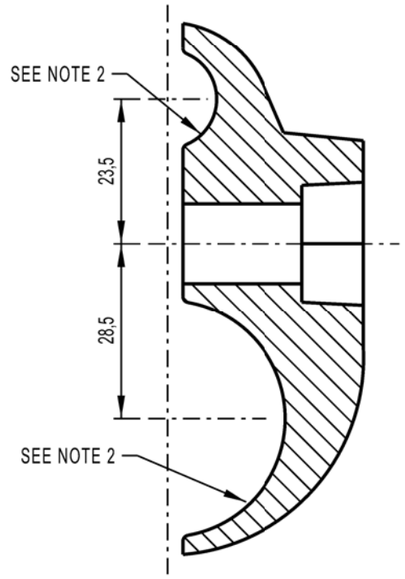
TRANSNET freight rail

BBG7987 SHT 2
VERSION 4 A3



SECTION X-X

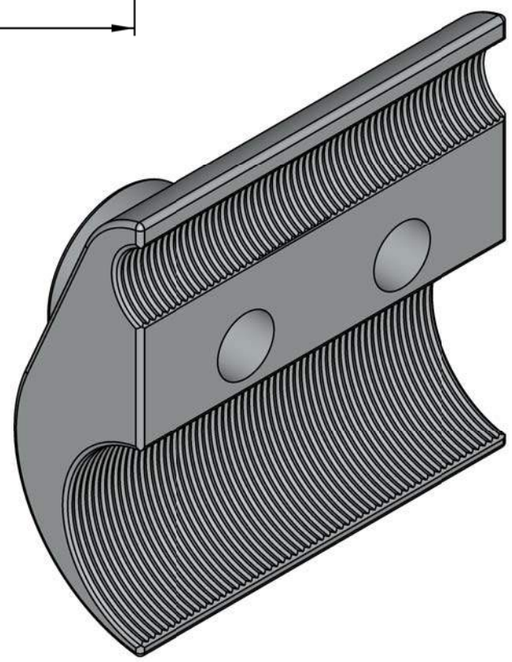


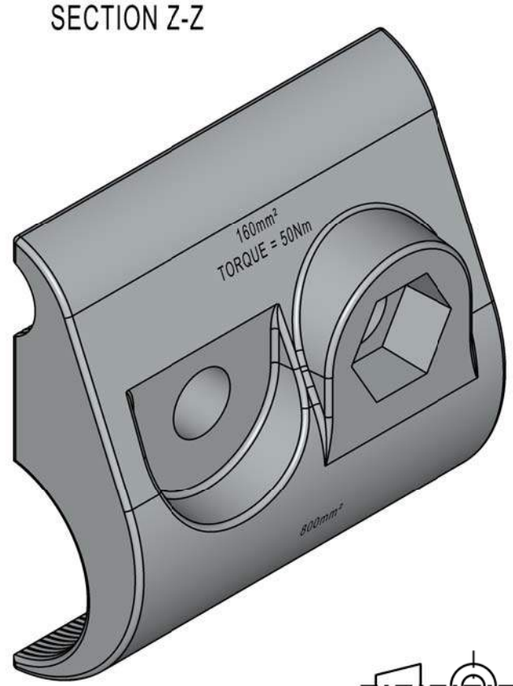


SECTION Z-Z

NOTES
1. WITH AN AMBIENT TEMPERATURE OF 20°C THE TEMPERATURE IN THE CLAMP SHALL NOT EXCEED 60°C WHEN APPLYING THE CURRENT IN TABLE 1.
2. CLAMPING SURFACES TO BE SERRATED, PITCH 1,5 x 0,3 DEEP.
3. ALL UNSPECIFIED RADDI R2.
4. RECESS TO SUITE M12 NUT.
5. FOR ASSEMBLY, SEE DRAWING BBG7987.
6. ALUMINIUM CLAMP TO SPECIFICATION CEE 0063.
7. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE = 50Nm

TABLE 1 (SEE NOTE 1)	
CONTINUOUS	1140A
5 MIN.	1840A
1 MIN.	3760A





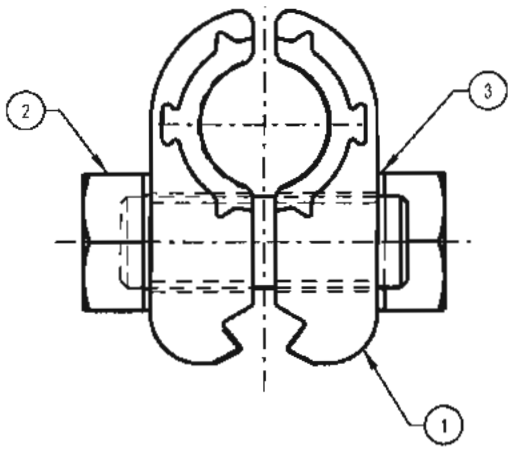
DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 1 ANG± -
MATERIAL : ALUMINIUM, GRADE 6063 TO SPEC CEE 0063.

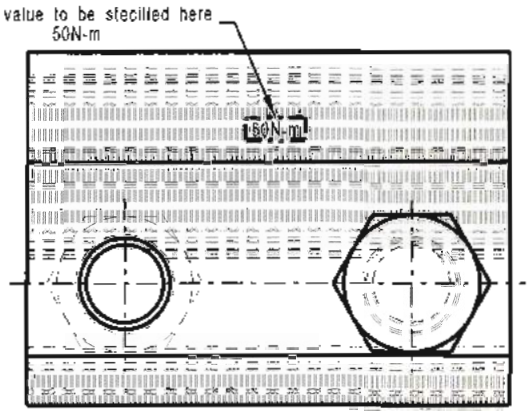
DRAWN : D HATTINGH CHECKED : D HATTINGH

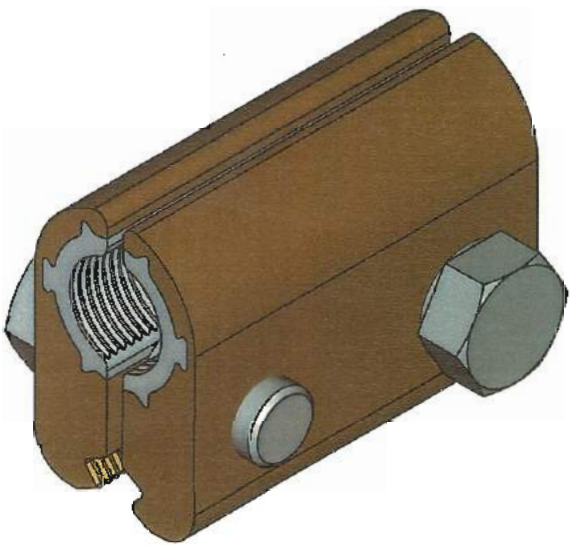
ALUMINIUM PARALLEL HALF CLAMP
800mm² Al FEEDER TO 160mm² Al.

TRANSNET freight rail

BBG7987 SHT 3
VERSION 4 A3







Note
1. Bi-metal feeder clamp to specification CEE-0063
2. The following permanent markings must appear on this article.
   a) Transnet Logo.
   b) Manufacturers identification.
   c) Dated batch number.
   d) Wire size.
   e) Torque value

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	Lock washer, Internally toothed, Stainless steel to Spec. AISI GR 304, M12	2	-	-
2	Bolt, Hexagon, Stainless steel to spec. AISI GR 304, Hex head, M12 x 35 long	2	-	-
1	Feeder half clamp	2	-	BBH0306 Sht 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± - ANG± - ITEM NO: 54/002152
MATERIAL : -
VERSION INFO : Notes and slots added.

+ 16 - 04 - 2019
APPROVED: S Smit

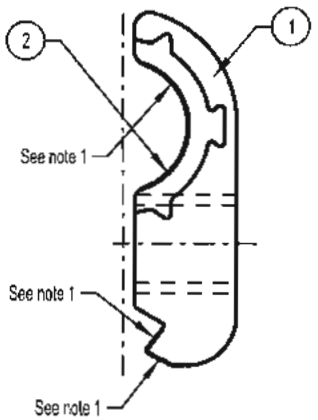
+ 16 - 04 - 2019
AUTHORISED. L O Borchard

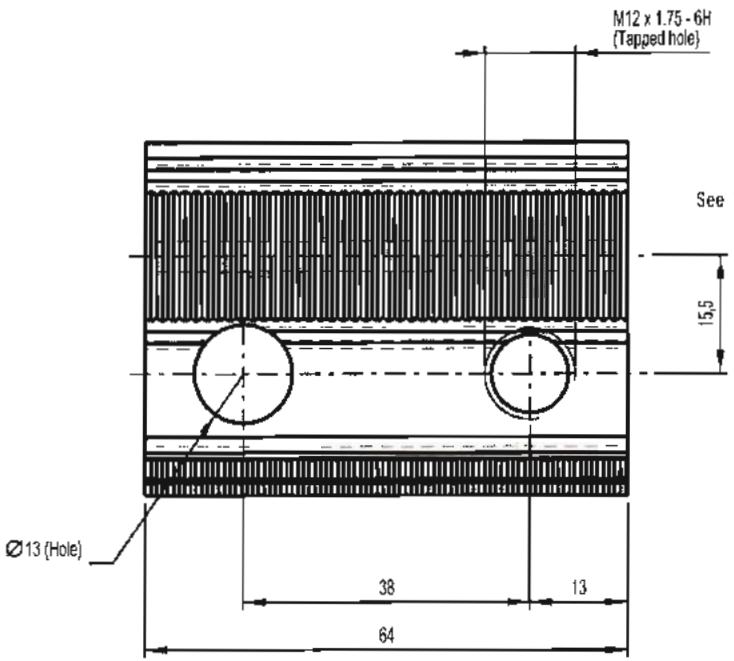
BI-METAL FEEDER CLAMP FOR 160mm² Al. / 107mm² Cu. CONTACT WIRE

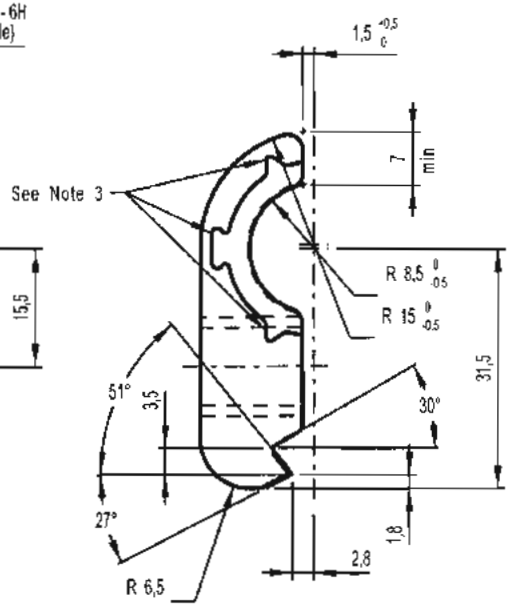
TRANSNET
freight rail

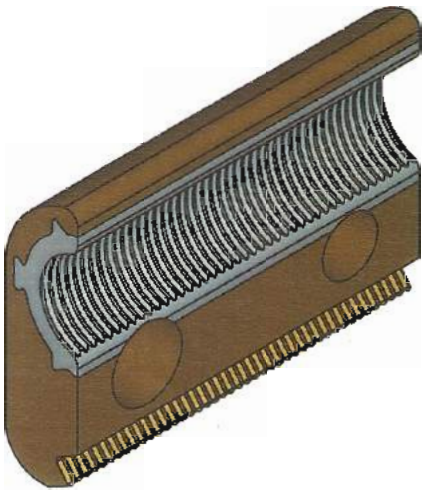
BBH0306
VERSION 4
A4

DO REF: CDO/ 9339 ECP REF: - DRAWN: D Hattingh DESIGNED: - CHECKED: D Hattingh









Notes:
1. These surfaces to be serated: 1.5 pitch x 0.3 deep.
2. All unspecified radii R2.
3. Slots in Cu-Ni-Si half clamp to prevent forcable removal of Aluminium liner after forging

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	Permanently Forged Aluminium Grade 6063 insert, 3mm thick	1	-	-
1	Cu-Ni-Si Alloy to Spec CEE-0063	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0.5 ANG± 0°30'
MATERIAL : -

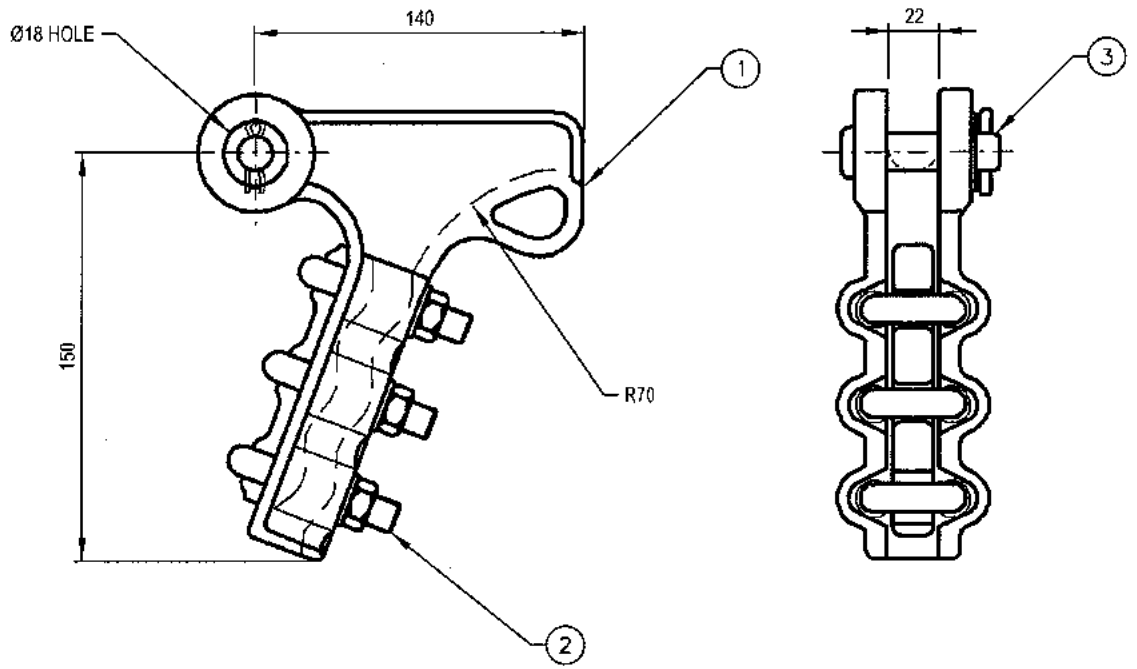
DRAWN : D Hattingh CHECKED : D Hattingh

BI-METAL FEEDER HALF CLAMP FOR 160mm² Al. / 107mm² Cu. CONTACT WIRE

TRANSNET freight rail

BBH0306 Sht 1

VERSION 4 A4



NOTE
1. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO
   b) MAKER'S IDENTIFICATION
   c) BATCH NO.
   d) WIRE SIZE
   e) TENSILE STRENGTH
2. MINIMUM TENSILE STRENGTH TO BE 70kN.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	CLEVIS PIN, Ø16mm x 60mm LG, WITH LOCKING SPLIT PIN	1	54004020	CEE-TX-0066
2	U BOLTS, M12, MILD STEEL, HOT DIP GALVANISE TO SANS 121	3	-	-
1	CLAMP BODY, ALUMINIUM CASTING	1	-	-

DIMENSIONS : mm SCALE : NTS
TOLERANCE : LIN± 0,5 ANG±0,5° ITEM NO : -
MATERIAL : -

VERSION INFO : -

+ 21-02-2018
APPROVED

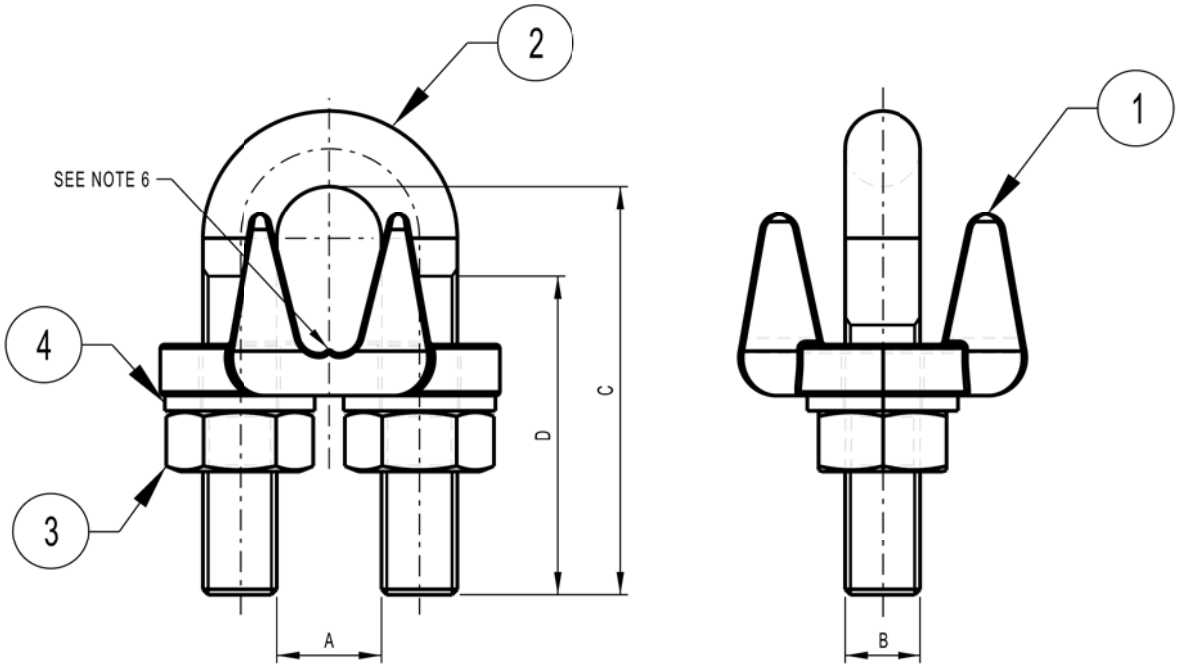
+21-2-2018
AUTHORISED

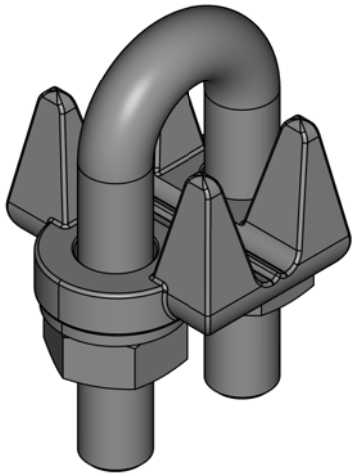
STRAIN CLAMP (PISTOL GRIP)
CONDUCTOR SIZE Ø5mm - Ø21mm

TRANSNET freight rail

BBH1118
VERSION 1
A4

DO REF: CDO/ 9014 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: H VAN VUUREN





STORES ITEM NO.	WIRE SIZE METRIC	WIRE SIZE INCHES	A	B	C	D MIN.
54003859	Ø8 TO Ø10	Ø 3/8	14.2	M10	38	27
54017021	Ø11 TO Ø 13	Ø1/2	17.5	M12	60	48
54001201	Ø16	Ø 5/8	19	M14	65	50
54003872	Ø19	Ø 3/4	22.3	M16	70	54
54032590	Ø22	Ø 7/8	25.4	M18	95	77

NOTE
1. CLAMP **NOT** FOR CONDUCTIVE PURPOSES AND ELECTRICAL SPLICING.
2. CLAMP TO BE USED AS MECHANICAL CLAMP ONLY.
3. CLAMP TO BE MADE IN ACCORDANCE TO SANS 813, HIGHER GRADE BODIES.
4. CLAMP FORCES TO BE EQUAL TO TABLE 2 IN SANS 813
5. CLAMP TO BE HOT DIPPED GALVANISE IN ACCORDANCE TO SANS 121.
6. PITCH TO SUIT CLAMP FORCES IN NOTE 3.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
4	SPRING LOCK WASHER, STEEL, SINGLE COIL, SQUARE SECTION, GALVANISED TO SANS 121.	2	-	-
3	HEXAGON NUT, STEEL GRADE 8.8, GALVANISED TO SANS 121.	2	-	-
2	U BOLT, STEEL, GALVANISED TO SANS 121 AFTER MANUFACTURED	1	-	-
1	CROSBY CLAMP SADDLE	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG±1° ITEM NO : -
MATERIAL : -

VERSION INFO : ITEM 3 AND 5 AMENDED.

28/02/2024
APPROVED: W SCHOEMAN

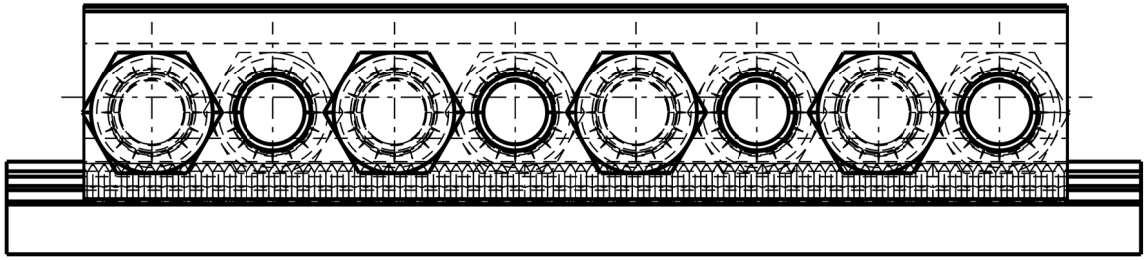
AUTHORISED: T GOVENDER

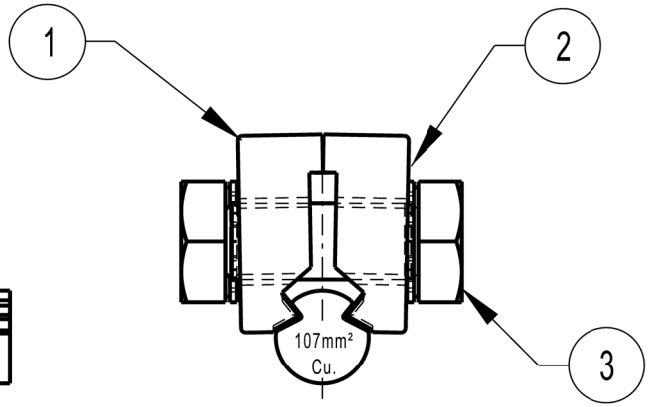
CROSBY CLAMP

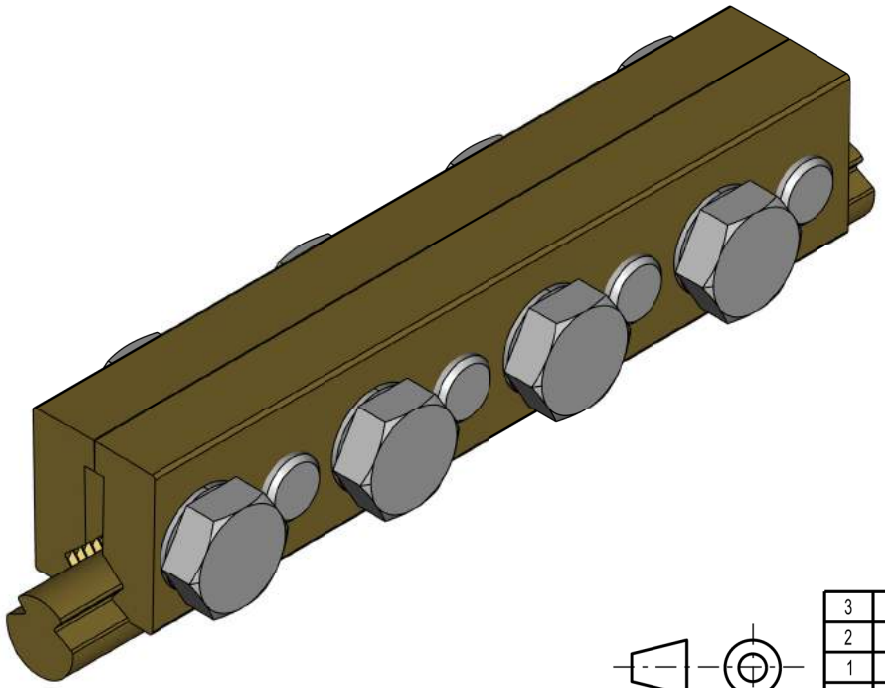
TRANSNET freight rail

BBH1889
VERSION 3
A4

DO REF: CDO/ E0471 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH







NOTE
1. CONTACT WIRE SPLICE TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) CONTACT WIRE SIZE.
   e) TORQUE = 3 x 46Nm

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC. CEE 0063, M10 x 30 LONG	8	-	-
2	WEDGE LOCK WASHER, STAINLESS STEEL TO SPEC. CEE 0063, M10	8	-	-
1	CHEEK, Cu-Ni-Si TO SPEC. CEE 0063.	2	-	BBH2137 SHT 2

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± - ANG± - ITEM NO : 54006827
MATERIAL : -

VERSION INFO : HOLE Ø11 CHANGED TO Ø11,5. HOLES MOVE DOWN.

+ 05/08/2020
APPROVED: W SCHOEMAN

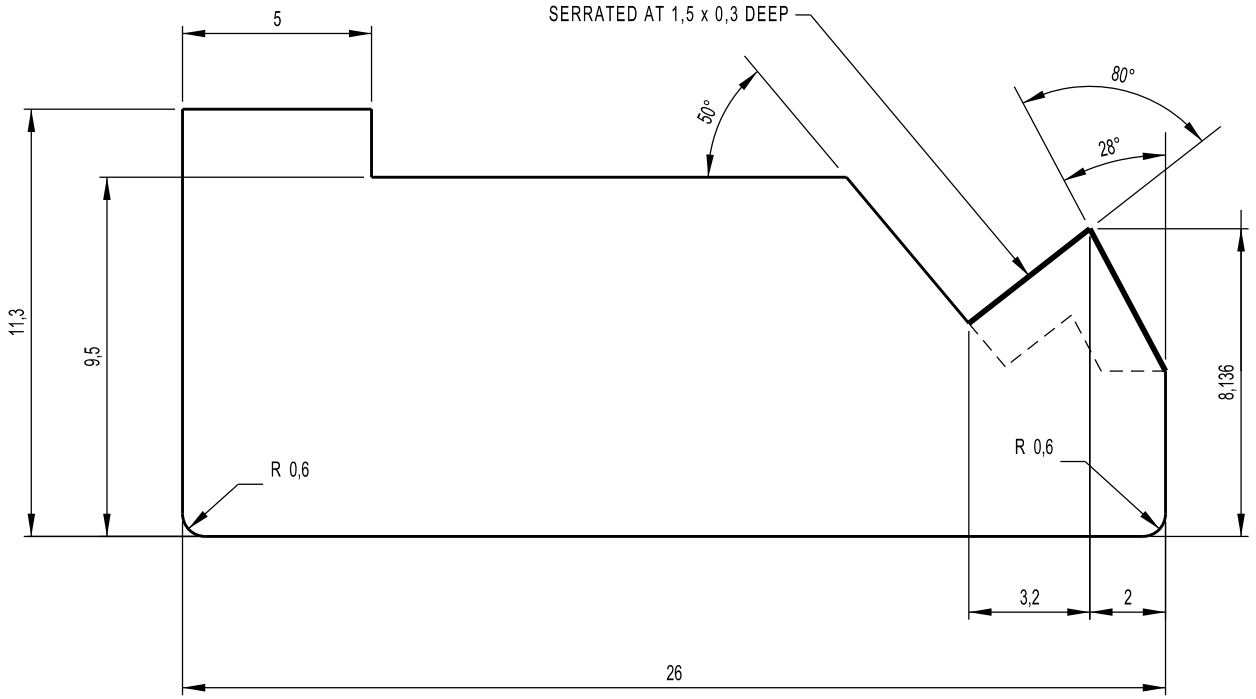
+ 05/08/2020
AUTHORISED: S SMIT

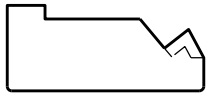
CONDUCTOR SPLICE ASSEMBLY
107mm² Cu. CONTACT WIRE

TRANSNET freight rail

BBH2137
VERSION 2
A4

DO REF: CDO/ E0013 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH





SCALE 1:1

DIMENSIONS : mm SCALE : 5 : 1
TOLERANCE : LIN± 0,2 ANG± 1°
MATERIAL : Cu-Ni-Si ALLOY TO SPEC CEE 0063

DRAWN : D HATTINGH CHECKED : D HATTINGH

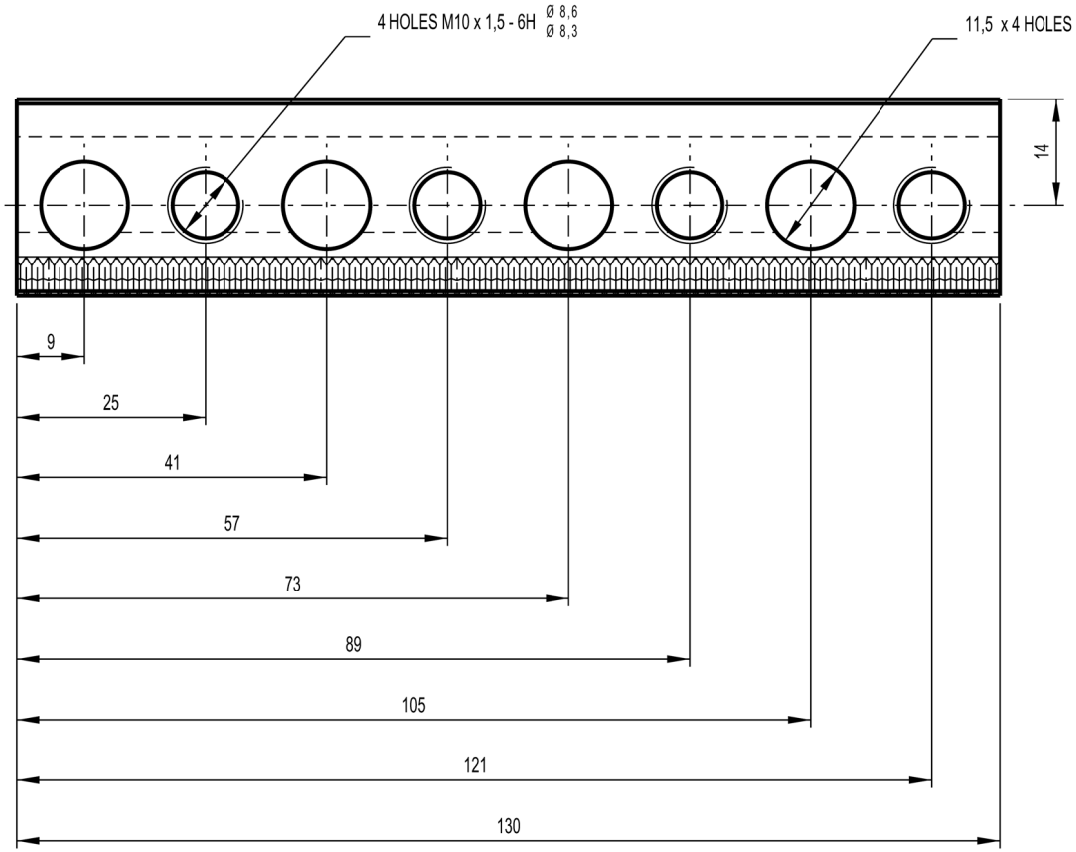
CONDUCTOR SPLICE PROFILE
107mm² Cu. CONTACT WIRE

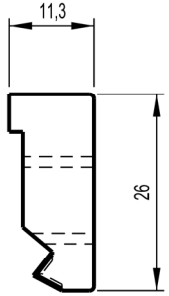
TRANSNET freight rail

BBH2137 SHT 1

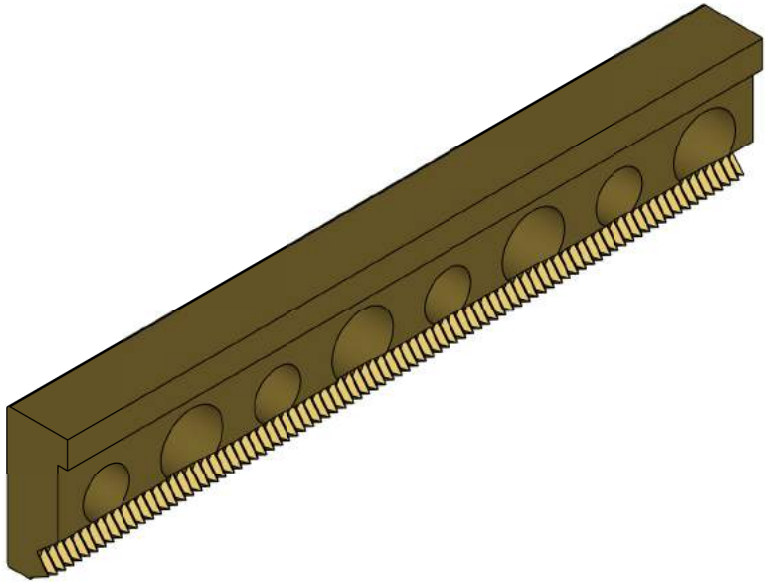
VERSION 2

A4

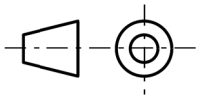




PROFILE AS PER BBH2137 SHT 1



NOTE
1. CONTACT WIRE SPLICE TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) CONTACT WIRE SIZE.
   e) TORQUE = 3 x 46Nm



DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,2 ANG±-
MATERIAL : Cu-Ni-Si ALLOY TO SPEC CEE 0063

DRAWN : D HATTINGH CHECKED : D HATTINGH

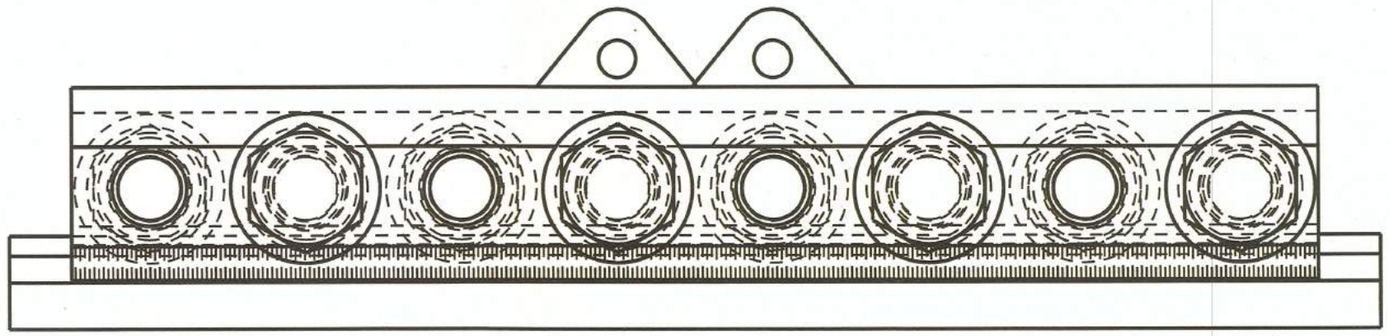
CONDUCTOR SPLICE CHEEK
107mm² Cu. CONTACT WIRE

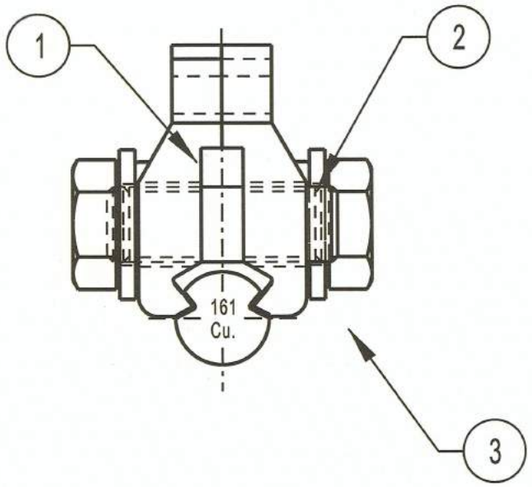
TRANSNET freight rail

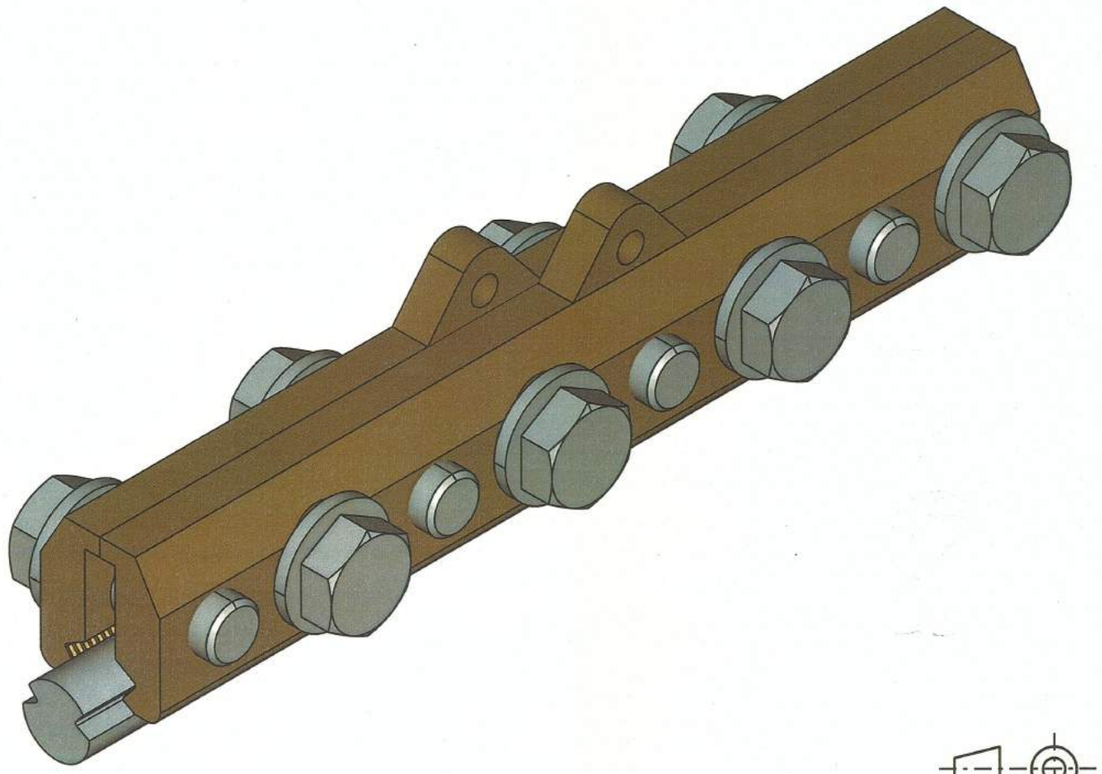
BBH2137 SHT 2

VERSION 2

A4







NOTE
1. CONTACT WIRE SPLICE TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) CONTACT WIRE SIZE.
   e) TORQUE = 3 x 67Nm
3. WHERE CONDITIONS PERMIT, THE SPLICE MUST BE SUSPENDED FROM THE CATENARY WITH A DROPPER.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC. CEE 0063, M12 x 35 LONG	8	-	-
2	WEDGE LOCK WASHER, STAINLESS STEEL TO SPEC. CEE 0063, M12	8	-	-
1	CHEECK, Cu-Ni-Si TO SPEC. CEE 0063	2	-	BBH2139 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 1° ITEM NO : 54000754
MATERIAL : -

VERSION INFO : -

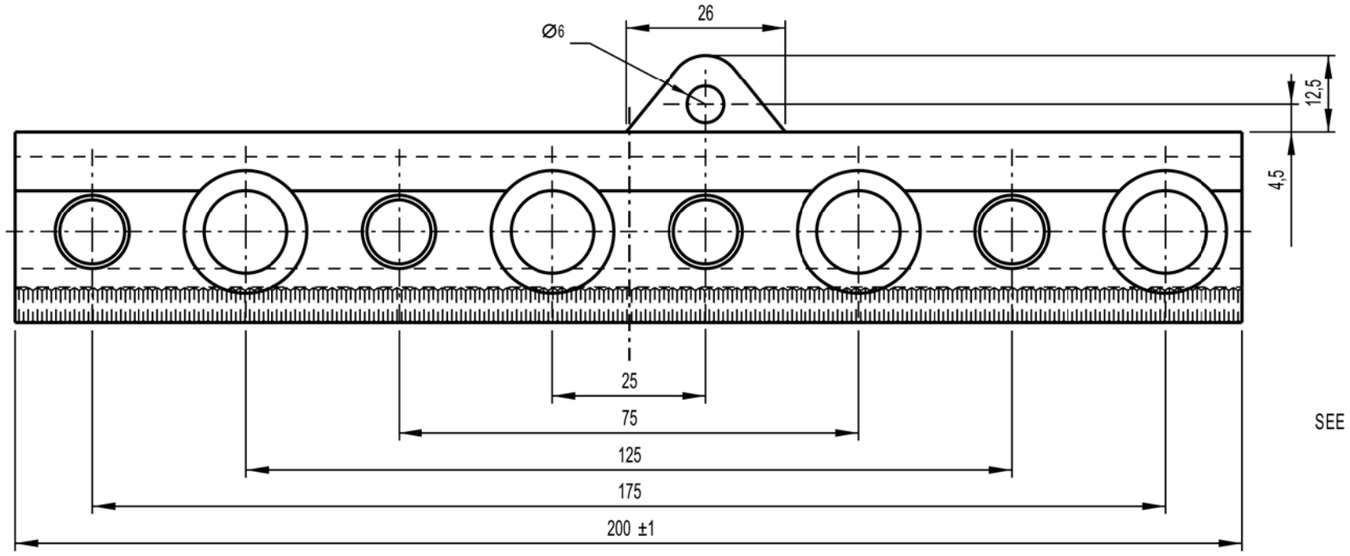
+ 17-04-2019
APPROVED : S SMIT

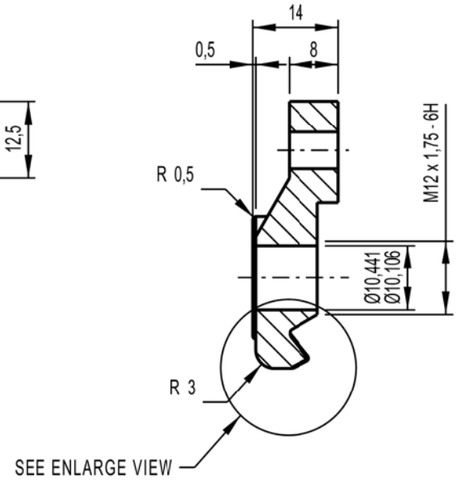
+ 17-04-2019
AUTHORISED : L O BORCHARD

CONDUCTOR SPLICE ASSEMBLY
161mm² Cu. CONTACT WIRE

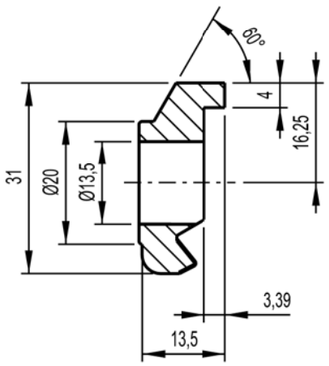
TRANSNET freight rail
BBH2139
VERSION 1 A3

DO REF: CDO/ 9339 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

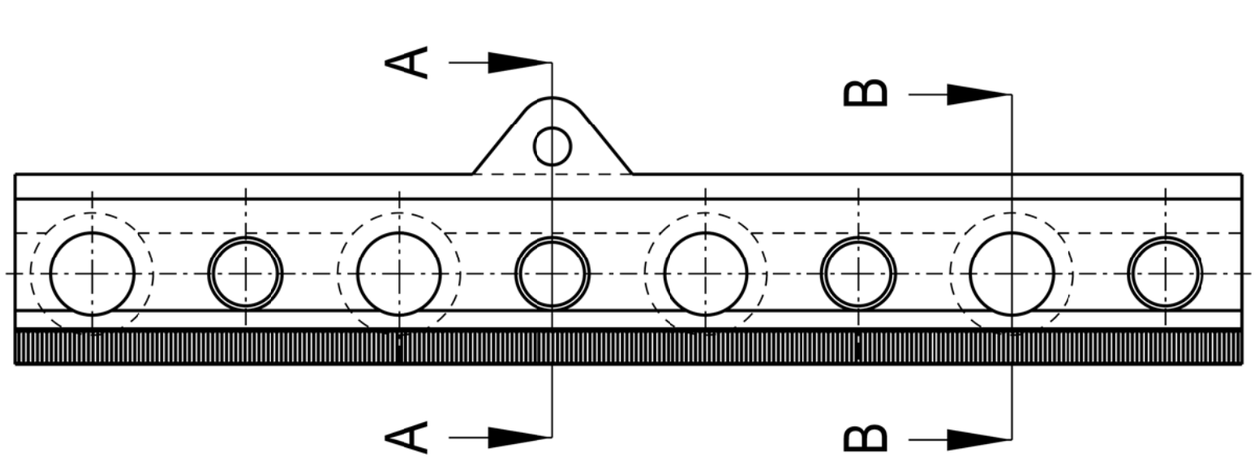


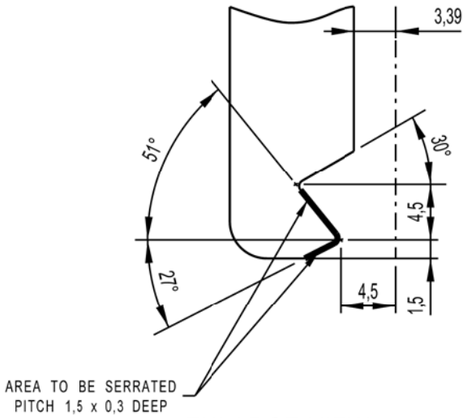


SECTION A-A

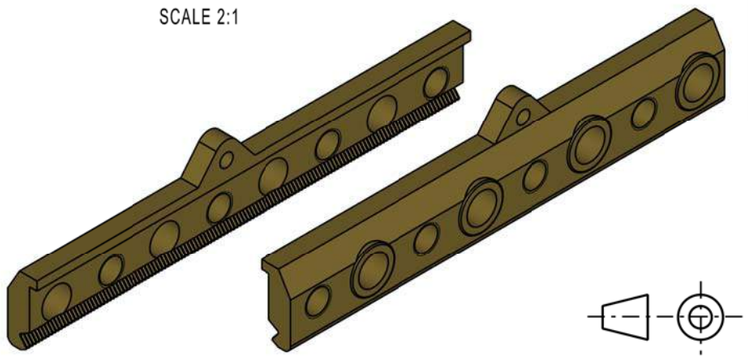


SECTION B-B





ENLARGE VIEW
SCALE 2:1



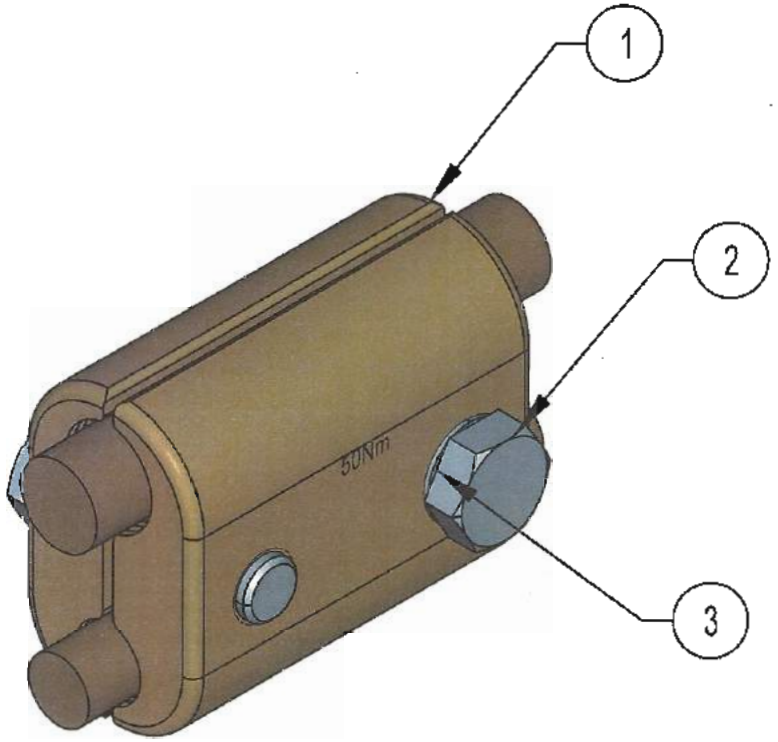
NOTE
1. CONTACT WIRE SPLICE TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) CONTACT WIRE SIZE.
   e) TORQUE = 3 x 67Nm

DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN± 0,5 ANG± 1°		
MATERIAL	: Cu-Ni-Si TO SPEC CEE 0063		
DRAWN	: D HATTINGH	CHECKED	: D HATTINGH

CHEEK, SPLICE
161mm² Cu. CONTACT WIRE

TRANSNET freight rail

BBH2139 SHT 1
VERSION 1 A3



STORES ITEM NO	CONDUCTOR SIZES
54000766	120mm² / 80mm² - 50mm²
54000791	100mm² / 80mm² - 100mm² / 80mm²
54002728	160mm² - 50mm²
54002753	160mm² - 100mm² / 80mm²
54002777	160mm² - 160mm²
54000843	250mm² - 50mm²
54000867	250mm² - 100mm² / 80mm²
54000880	250mm² - 160mm²
54000907	250mm² - 250mm²

NOTE
1. PARALLEL CLAMP TO SPECIFICATION CEE 0063.
2. PARALLEL CLAMPS TO BE SUPPLIED AS A COMPLETE ASSEMBLY.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	LOCKING WASHER, INTERNALLY TOOTHED, STAINLESS STEEL TO SPEC AISI GR 304, M12	2	-	-
2	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC AISI GR 304, M12 x 35 LONG.	2	-	-
1	PARALLEL HALF CLAMP	2	-	BBH2141 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± - ITEM NO : -
MATERIAL : -

VERSION INFO : -

+ 2019-05-15
APPROVED: S SMIT

+ 2019-05-15
AUTHORISED: L O BORCHARD

PARALLEL CLAMP FOR VARIOUS COPPER CONDUCTOR SIZES

TRANSNET
freight rail

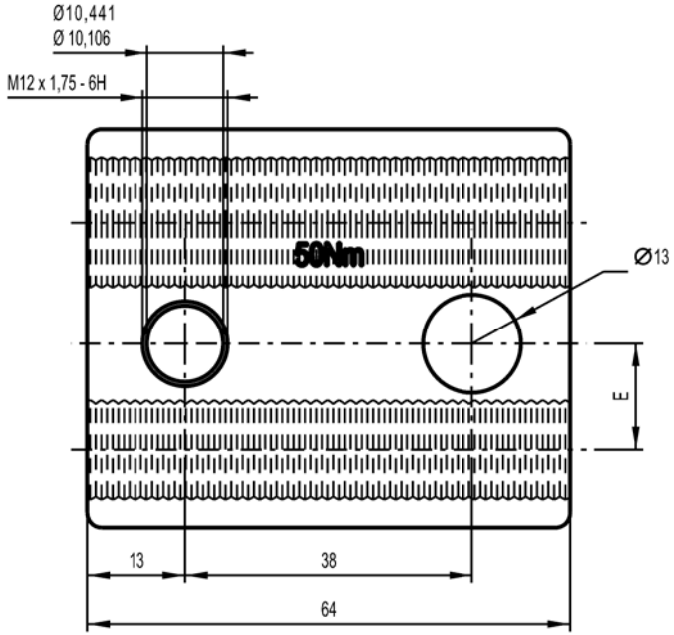
BBH2141
VERSION 1 A4

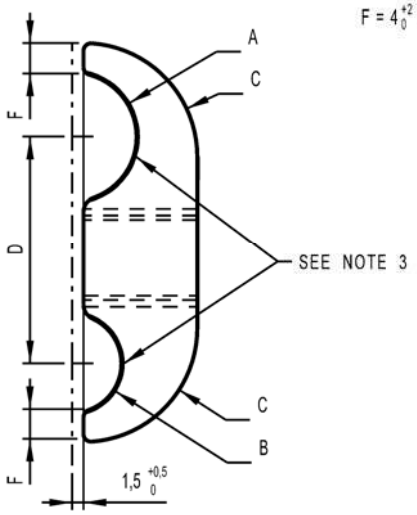
DO REF: CDO/ 9365 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

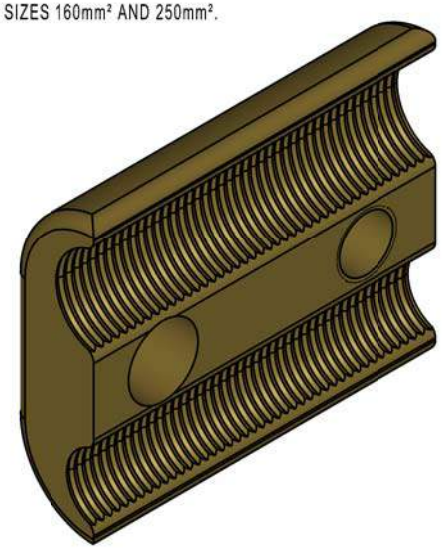
NOTES
1. PARALLEL CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) CONDUCTOR SIZES.
   e) TORQUE = 50Nm.
3. THESE SURFACES TO BE SERRATED: 1,5 PITCH x 0,3 DEEP.
4. ALL UNSPECIFIED RADII R2.

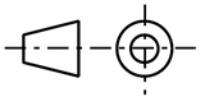
STORES ITEM NO.	CONDUCTOR SIZES	DIMENSIONS					
		A	B	C	D	E	F
54000766	100mm² / 80mm² - 50mm²	$6,5^{\ 0}_{-0,5}$	$4,5^{\ 0}_{-0,5}$	15	26	12	$4^{\ +1}_{\ 0}$
54000791	100mm² / 80mm² - 100mm² / 80mm²	$6,5^{\ 0}_{-0,5}$	$6,5^{\ 0}_{-0,5}$	15	28	14	$4^{\ +1}_{\ 0}$
54002728	160mm² - 50mm²	$8,5^{\ 0}_{-0,5}$	$4,5^{\ 0}_{-0,5}$	15	28	12	*
54002753	160mm² - 100mm² / 80mm²	$8,5^{\ 0}_{-0,5}$	$6,5^{\ 0}_{-0,5}$	15	30	14	*
54002777	160mm² - 160mm²	$8,5^{\ 0}_{-0,5}$	$8,5^{\ 0}_{-0,5}$	15	32	16	$4^{\ +2}_{\ 0}$
54000843	250mm² - 50mm²	$10,5^{\ 0}_{-0,5}$	$4,5^{\ 0}_{-0,5}$	18	30	12	*
54000867	250mm² - 100mm² / 80mm²	$10,5^{\ 0}_{-0,5}$	$6,5^{\ 0}_{-0,5}$	18	32	14	*
54000880	250mm² - 160mm²	$10,5^{\ 0}_{-0,5}$	$8,5^{\ 0}_{-0,5}$	18	34	16	$4^{\ +2}_{\ 0}$
54000907	250mm² - 250mm²	$10,5^{\ 0}_{-0,5}$	$10,5^{\ 0}_{-0,5}$	18	36	18	$4^{\ +2}_{\ 0}$

* $F = 4^{\ +1}_{\ 0}$ FOR CONDUCTOR SIZES 50mm², 80mm² AND 100mm².
$F = 4^{\ +2}_{\ 0}$ FOR CONDUCTOR SIZES 160mm² AND 250mm².









DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± -
MATERIAL : Cu-Ni-Si TO SPEC. CEE 0063.

DRAWN : D HATTINGH CHECKED : D HATTINGH

PARALLEL HALF CLAMP FOR VARIOUS COPPER CONDUCTOR SIZES

TRANSNET freight rail

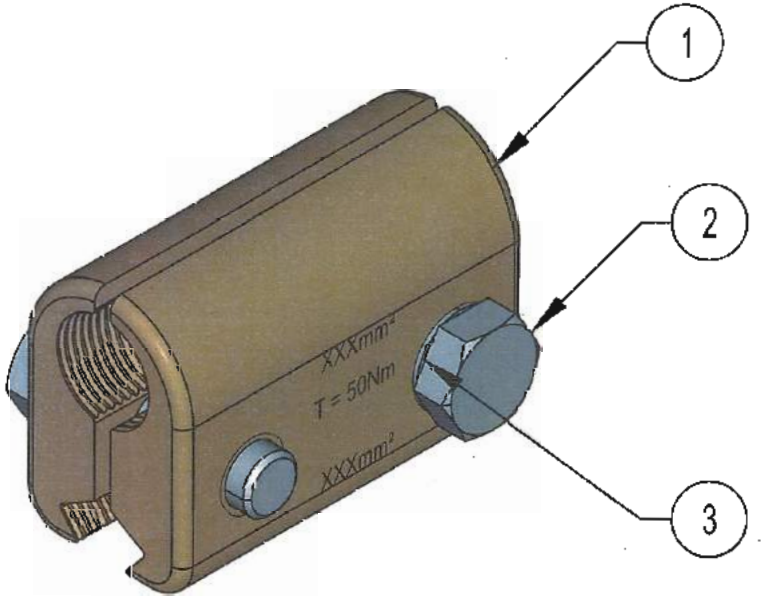
BBH2141 SHT 1

VERSION 1

A4

NOTES
1. FEEDER CLAMP TO SPECIFICATION CEE 0063.
2. FEEDER CLAMP TO BE SUPPLIED AS A COMPLETE ASSEMBLY.

STORES ITEM NO. FOR 107mm² CONTACT WIRE	STORES ITEM NO. FOR 161mm² CONTACT WIRE	COPPER CONDUCTOR SIZES
54014849	54000920	50mm² / 63mm² / 70mm²
54014850	54001949	80mm² / 100mm²
54014862	54004930	160mm²
54014874	54004954	250mm²



ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	LOCKING WASHER, INTERNALLY TOOTHED, STAINLESS STEEL TO SPEC. AISI GR 304, M12.	2	-	-
2	BOLT, HEXAGON HEAD, STAINLESS STEEL TO SPEC. AISI GR 304, M12 x 35 LONG.	2	-	-
1	FEEDER HALF CLAMP FOR 161mm² CONTACT WIRE.	2	-	BBH2142 SHT 2
	FEEDER HALF CLAMP FOR 107mm² CONTACT WIRE.	2	-	BBH2142 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG±0,5° ITEM NO : -
MATERIAL : -
VERSION INFO : -

2019-05-28
APPROVED: S SMIT

2019-05-28
AUTHORISED: L O BORCHARD

FEEDER CLAMP ASSEMBLY FOR 107mm² AND 161mm² Cu. CONTACT WIRE

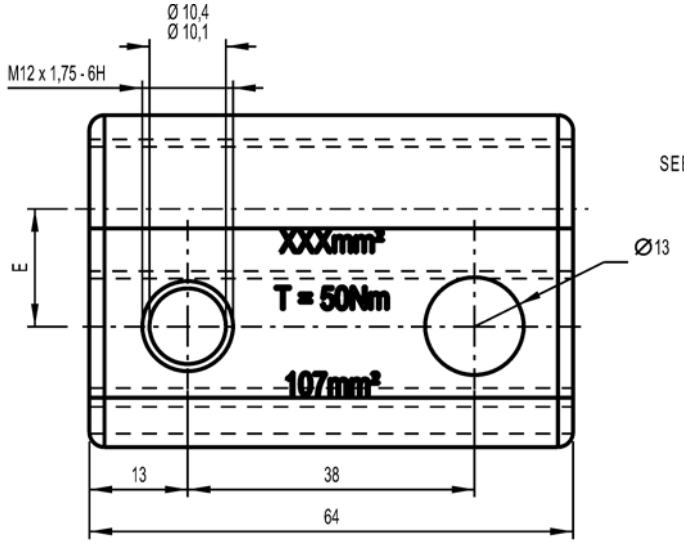
TRANSNET freight rail

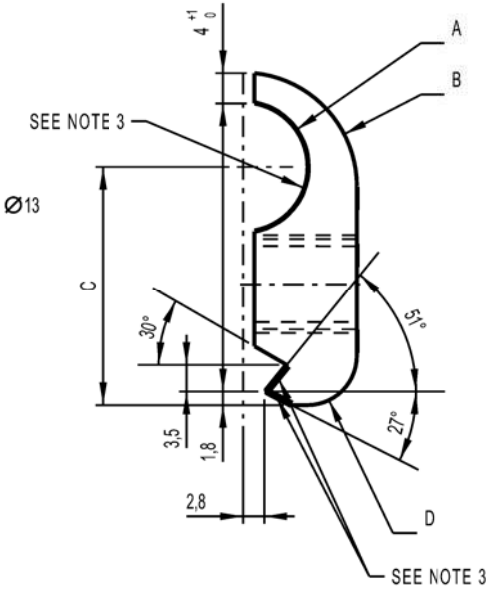
BBH2142
VERSION 1
A4

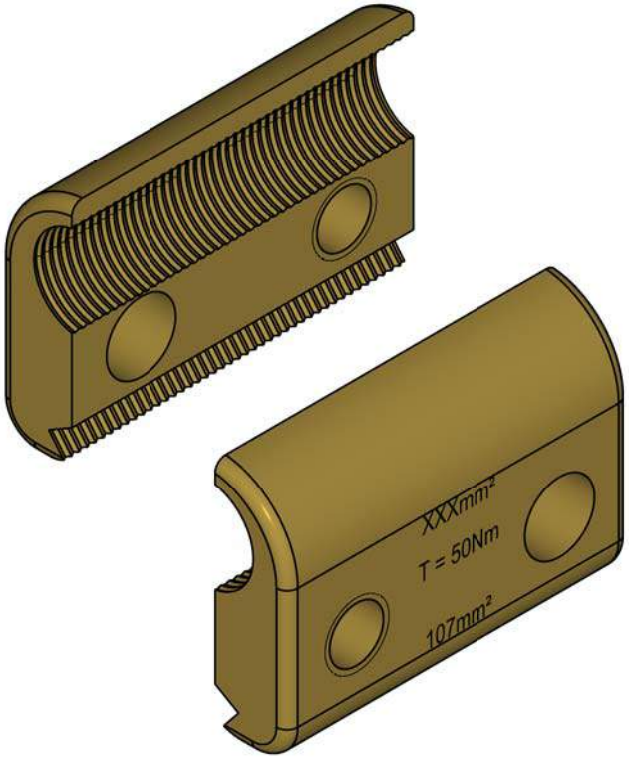
DO REF. CDO/ 9365 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

COPPER CONDUCTOR SIZES	DIMENSIONS				
	A	B	C	D	E
50mm² / 63mm² / 70mm²	$4,5^{\ 0}_{-0,5}$	$15^{\ 0}_{-0,5}$	27,5	6,5	11,5
80mm² / 100mm²	$6,5^{\ 0}_{-0,5}$	$15^{\ 0}_{-0,5}$	29,5	6,5	13,5
160mm²	$8,5^{\ 0}_{-0,5}$	$15^{\ 0}_{-0,5}$	31,5	6,5	15,5
250mm²	$10,5^{\ 0}_{-0,5}$	$18^{\ 0}_{-0,5}$	33,5	9,5	18

NOTES
1. FEEDER CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE AS "T = 50Nm".
3. THESE SURFACES TO BE SERRATED: 1,5 PITCH x 0,3 DEEP.
4. ALL UNSPECIFIED RADII R2.







DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 0,5°
MATERIAL : Cu-Ni-Si TO SPEC. CEE 0063.

DRAWN : D HATTINGH CHECKED : D HATTINGH

FEEDER HALF CLAMP FOR 107mm² Cu. CONTACT WIRE

TRANSNET freight rail

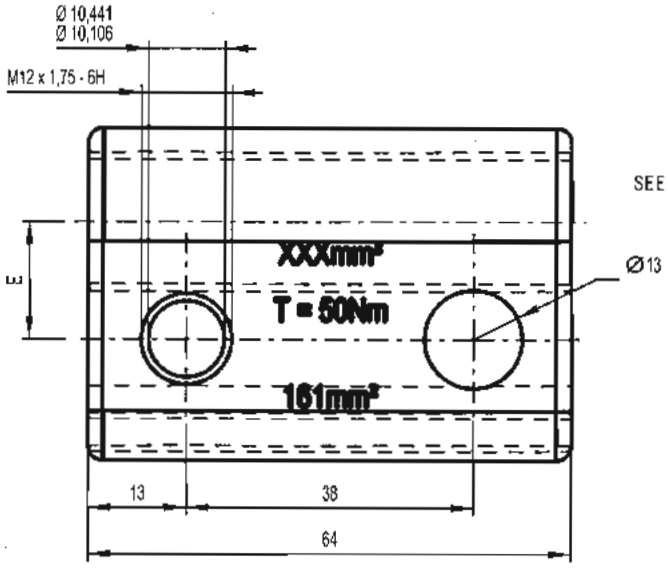
BBH2142 SHT 1

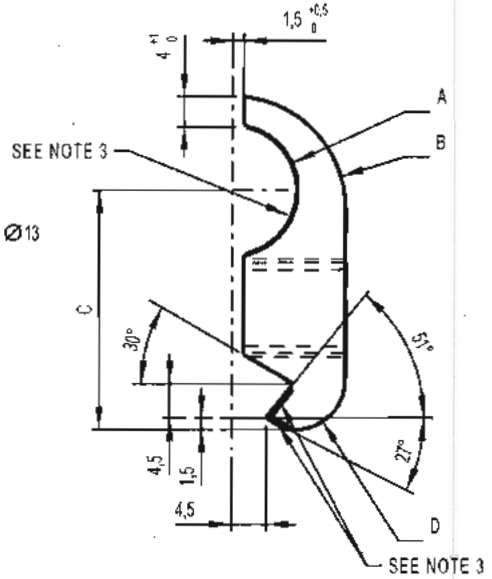
VERSION 1

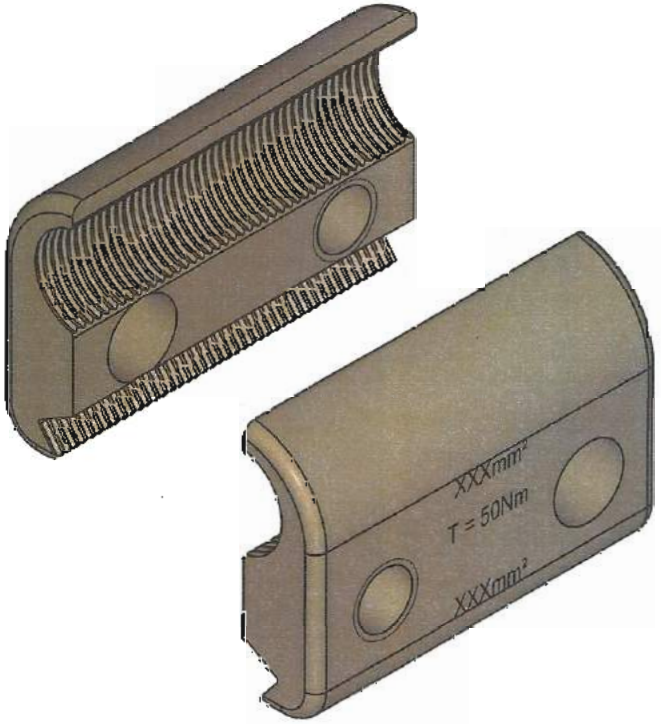
A4

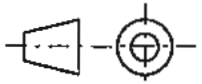
COPPER CONDUCTOR SIZES	DIMENSIONS				
	A	B	C	D	E
50mm²	$4,5^{0}_{-0,5}$	$15^{0}_{-0,5}$	27,5	6,5	11,5
80mm² / 100mm²	$6,5^{0}_{-0,5}$	$15^{0}_{-0,5}$	29,5	6,5	13,5
160mm²	$8,5^{0}_{-0,5}$	$15^{0}_{-0,5}$	31,5	6,5	15,5
250mm²	$10,5^{0}_{-0,5}$	$18^{0}_{-0,5}$	33,5	9,5	18

NOTES
1. FEEDER CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
   d) WIRE SIZES.
   e) TORQUE AS "T = 50Nm".
3. THESE SURFACES TO BE SERRATED: 1,5 PITCH x 0,3 DEEP.
4. ALL UNSPECIFIED RADII R2.









DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 0,5
MATERIAL : Cu-Ni-Si TO SPEC CEE 0063.

DRAWN : D HATTINGH CHECKED : D HATTINGH

FEEDER HALF CLAMP FOR 161mm² Cu. CONTACT WIRE

TRANSNET
freight rail

BBH2142 SHT 2
VERSION 1
A4

A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

REQUIREMENTS FOR DISTRIBUTION SYSTEM GAPLESS METAL OXIDE SURGE ARRESTER

Author:	Engineer Technology Management	T.G. Mangwegape	tumelo
Approved by:	Principal Engineer (Acting) Technology Management	S. Smit	
		Date:	10 March 2022

Circulation Restricted To:

Transnet and Relevant Third Parties

LIST OF AMENDMENTS TO THE SPECIFICATION

Version No.	Date Issued	Clause No.	Page No.	Remarks
01	22 July 2020	All	All	New publication of BBH 2339
02	05 Oct 2021	N/A	1	POPIA disclaimer added.
03	10 Mar 2022	N/A	1	Approval included
		7	7	Document requirements amended

TABLE OF CONTENTS

1.0 SCOPE

1.1. This specification details Transnet's requirements for the supply of the distribution class gapless metal oxide surge arrester.

1.2. The surge arrester shall be installed on the 6.6kV, 11kV Transnet's distributions systems.

1.3. This specification contains the schedule of requirements (Annexure A) which must be completed by the relevant Transnet Representative.

1.4. This specification contains the technical datasheet (Annexure B) which must be completed by the supplier and shall be submitted as part of the tender documents.

2.0 NORMATIVE REFERENCES

Unless otherwise specified all materials used, equipment developed and supplied shall comply with the latest edition of the relevant International Electro-technical Commission (IEC), International Organization for Standardization (ISO), South African National Standards (SANS) or Transnet publications.

2.1. IEC STANDARDS

IEC 60060-2, High-voltage test techniques – Part 2: Measuring systems.

IEC 60071-2, Insulation co-ordination – Part 2: Application.

2.2. SANS STANDARDS

SANS 1019, Standard voltages, currents and insulation levels for electricity supply.

SANS 2230, Rubber products - Guidelines for storage.

SANS 9001, Quality management systems – Requirements.

SANS 60099-4, Surge Arresters - Part 4: Metal-oxide surge arresters without gap for A.C. system.

SANS 60099-5, Surge Arresters – Part 5: Selection and application recommendations.

SANS 60815-3, Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for A.C. systems.

2.3. TRANSNET DRAWING

BBH2143, Distributions system - Gapless metal oxide surge arrester.

3.0 SERVICE CONDITIONS

3.1. ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level.
Relative humidity:	10% to 90%.
Ambient temperature:	-10° C to +55° C.
Wind pressure:	750 Pa.
Lightning conditions:	20 ground flashes/km2 per annum.
Pollution:	Heavily salt laden with industrial pollutants including diesel- electric locomotive emissions.

3.2. **ELECTRICAL SERVICE CONDITIONS**

3.2.1. Nominal power system frequency shall be 50Hz.

3.2.2. The Transnet's distributions systems operate on the three phase 6.6kV AC and three phase 11kV AC.

3.3. **BASIC INSULATION LEVEL (BIL)**

3.3.1. The standard insulation levels shall be of range A, as per Table 2 of SANS 1019.

Table 1 : Insulation level for distribution class gapless metal oxide surge arresters.

Maximum System Voltage (U_m)	Nominal System Voltage (U_n)	Basic insulation level of the protected equipment (BIL)	Rated short duration Power-frequency withstand voltage.
r.m.s	r.m.s	Peak	r.m.s
7.2 kV	6.6 kV	75 kV	22 kV
12 kV	11 kV	95 kV	28 kV

4.0 TECHNICAL REQUIREMENTS

4.1. The supplied surge arrester shall be polymer housed surge arrester without grading rings.

4.2. The supplied surge arrester shall be suitable for vertical position installation and not to be suspended.

4.3. The provided surge arrester shall be compatible for solidly earthed system, to limit overvoltage's during fault conditions.

4.4. Surge arrester must be provided with all required bolts and nuts and locking washers of either galvanized steel or stainless steel, see BBH2143.

4.5. The supplied arrester shall be equipped with a disconnector and an insulating bracket.

4.6. The earth connection leads shall be flexible copper conductor to maintain a sufficient insulation distance beneath the arrester so that the disconnected earth connection can hang freely. This requirement is to ensure that the applied voltage that occurs at the foot of the arrester does not lead to spark-over after disconnector operation.

4.7. The material for the cooper lead shall be suitable to withstand the nominal discharge current of 10kA for 8/20 micro seconds.

4.8. The length of the earth connection lead shall be selected based on the nominal outdoor earth clearance, see table 2 of this document.

Table 2 : Schedule of ratings for the distribution class gapless metal oxide surge arresters.

Description	Values	
a) Nominal system voltages (U_n)	6.6kV	11kV
b) Rated voltage of surge arrester (U_r)	6kV	11kV
c) Maximum system voltage (U_m)	7.26kV	12.10kV
d) Nominal discharge current (I_n), $8/20\mu s$	10kA	10kA
e) Highest discharge current (I_n), $4/10\mu s$	100kA	100kA
f) Pressure relief	40kA	40kA

g) Line discharge class, 10 000A	DH	DH
h) Outdoor earth clearance	150mm	200mm
i) Minimum creepage	230mm	390mm

5.0 TESTING AND INSPECTIONS

5.1. GENERAL TESTS REQUIREMENTS

5.1.1. Transnet reserves the right to be present at all tests and inspections as called for in this clause.

5.1.2. The responsibility of arranging the tests called for in this clause rests with the successful supplier.

5.1.3. A Transnet Freight Rail, Technology Management (Electrical Technology) department representative may request any additional test deemed necessary to ensure compliance.

5.1.4. All certificates of the listed tests shall be supplies to TFR Technology Management for verification and inspection.

5.2. TYPE TESTS

5.2.1. The measuring equipment used for testing shall meet the minimum requirements of IEC 60060-2 and the provided values shall be accepted as accurate by Transnet Representative.

5.2.2. The following type test shall be performed as described in Clause 8 of SANS 60099-4 for the procured polymer housed surge arrester.

a) Insulation withstand test.

b) Residual voltage test.

c) Test to verify long term stability under continuous operating voltage.

d) Test to verify the repetitive charge transfer rating Qrs.

e) Heat dissipation behavior of test sample.

f) Test of arrester disconnector.

g) Test of bending moment.

h) Test to verify dielectric withstand of internal component.

i) Test of internal grading component.

j) Operating duty test passes if it meets criteria listed in clause 10.8.7.

k) Power frequency voltage-versus-time test passes if it meets criteria listed in clause 10.8.8.

l) Short circuit test passes if it meets criteria listed in clause 10.8.10.

m) Seal leak rate test passes if it meets criteria listed in clause 10.8.13.

5.3. ROUTINE TESTS

5.3.1. The routine test shall be performed in accordance to Clause 9 of SANS 60099-4 for the procured polymer housed surge arrester. The required test are as follows:

a) Reference voltage measured.

b) Residual voltage test.

c) Internal partial discharge test.

d) Partial discharge level measurements at power-frequency voltage increased to the rated voltage of the sample, held for 2 seconds to 10 seconds, and then decreased to 1,05 times the continuous operating voltage.

e) Assembly of the disconnector.

5.4. **ACCEPTANCE TESTS**

5.4.1. The following standard acceptance test shall be performed in accordance to clause 9 of SANS 60099-4:

a) Measurement of power-frequency voltage at reference current.

b) Lightning impulse residual voltage on the arrester at nominal discharge current.

c) Internal partial discharge.

d) Bending moment and tensile load on the disconnector.

6.0 RATING PLATE, MARKINGS AND INSTRUCTION LABELS

6.1. The supplied metal-oxide surge arrester shall be identified by the following information. These parameters shall be visible and permanently marked on the surge arrester:

6.1.1. Name/logo of the original manufacturer.

6.1.2. Year manufactured.

6.1.3. Class Number.

6.1.4. Rated voltage U_r.

6.1.5. Continuous operating voltage U_c.

6.1.6. Nominal discharge current I_n (kA).

6.1.7. Batch number.

7.0 DOCUMENTATION REQUIREMENTS

7.1. Documents shall be written in English.

7.2. All units indicated in the provided documentation shall be in metric system.

7.3. The tenderers shall provide technical datasheets with tender.

7.4. The successful tenderer shall provide design and type test certificates to verify conformance to the requirements.

8.0 QUALITY ASSURANCE

8.1. The successful supplier shall maintain a Quality Management System (QMS) based on or certified to SANS 9001.

9.0 PACKAGING, STORAGE AND HANDLING

9.1. The packaging of the device shall conform to clause 5 of SANS 2230.

9.2. Unless specified by Transnet representative, the metal oxide surge arrester shall be enclosed in an individual sealed envelopes or in a sealed multiple envelop provided that they can be removed without affecting the sealing of the remaining items in the package.

9.3. No part should be tied or tagged in such a way as to cause damage on the sheds of the arrester.

9.4. Installation instructions and storage instructions shall be visible and be printed on the outside of the package.

10.0 GUARANTEE AND DEFECTS

10.1. The appointed supplier shall guarantee that the supplied gapless metal oxide surge arrester conforms to Transnet's requirements.

10.2. The appointed supplier shall accept liability for makers' defects, which may appear in design, material and workmanship.

11.0 TECHNICAL COMPLIANCE

11.1. Tenderer shall indicate clause-by-clause compliance document with the specification. This shall take the form of a separate document listing each of the specification's clause and sub-clause numbers, indicating the individual statements of compliance or non-compliance.

11.2. Statement of non-compliance shall be motivated by the tenderer, as per 11.1.

11.3. Tenderer shall submit comprehensive literature consisting of detailed technical specifications, general constructional details and principal dimensions, maintenance schedules if necessary, datasheets, together with clear illustrations of the equipment offered.

11.4. Any items offered in accordance with other standards will be considered at the sole discretion of Transnet Freight Rail, Technology Management, Electrical Technology Department. The tenderer shall supply full details stating where the item differs from these specifications as well as supplying a copy (in English) of the recognized standard specification(s) with which it complies. Any deviations must be approved by the relevant Transnet Freight Rail, Technology Management, Electrical Technology Department in writing.

11.5. Failure to comply with clauses 11.1, 11.2, 11.3 and 11.4 could preclude a tenderer from consideration.

11.6. In the event of any conflict between the various submitted relevant documents, the order of precedence shall be, and in consultation with Transnet Freight Rail, Technology Management, Electrical Technology Department:

a) Legal and safety requirements.

b) This Specification.

APPENDIX A: SCHEDULE OF REQUIREMENTS

(To be completed by relevant Transnet Freight Rail Representative)

Descriptions	Values
Name of the Depot	
Name of the Province	
System voltage	
Quantity procured	
Special requirements	…… …… …… …… …… …… …… …… ……

Completed by ……

Capacity ……

Signature ……

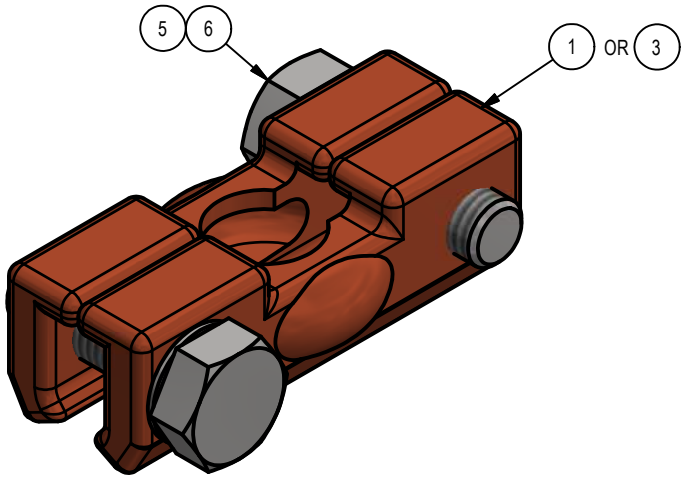
Date ……

APPENDIX B: TECHNICAL DATASHEET

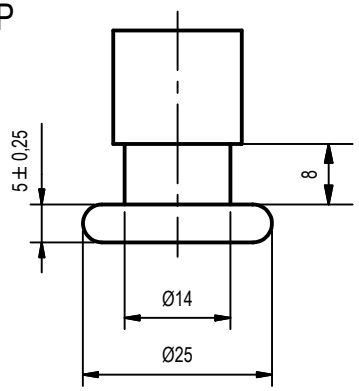
(To be completed by the tenderers and submitted as part of their tender)

Details of the surge arrester	**Values**	**Unit**
Surge arrester identification		
a) Manufacturer Name		
b) Surge arrester class		
c) Rated voltage (U_r)		kV
d) Minimum continuous operating voltage (U_c)		kV
Overvoltage (minimum TOV) for		
1 seconds		kV
10 seconds		kV
Insulations withstand test		
e) Test voltage		kV
f) Lightning impulse protection level $\times$ 1.3		kV
g) Maximum switching impulse residual voltage $\times 1.1e^{m\times\frac{1800}{8150}}$ $m < 1$ $[IEC\ 600071-2, figure\ 9]$		kV
h) Power frequency voltage		kV Peak
i) Lightning impulse protection level $\times$ 0.88 for 1 min		kV
Residual voltage test		
j) Maximum reference voltage		kV
k) Measured residual voltage		kV
l) Lightning current impulse		A
Test to verify long term stability under continuous operating voltage		
m) MO resistor power losses start		Watts
n) MO resistor power losses end		Watts
Repetitive charge transfer withstand		
o) repetitive charge transfer rating		Coulombs
Heat dissipation behaviour		
p) rated thermal energy		kJ/kV
q) rated charge transfer		Coulombs
Verify the dielectric withstand capability		
r) Duration for heating sample at 60 degrees Celsius		Second
s) Duration for completing the test		Minutes
t) Dielectric breakdown on oscillogram		
u) Start residual voltage at nominal discharge current		kV
v) End residual voltage at nominal discharge current		kV
w) Visual examination on the MO resistors		
x) Was two current impulse 8/20 applied?		
y) Visual examination on the MO resistors after current impulse 8/20 applied to check dielectric breakdown.		

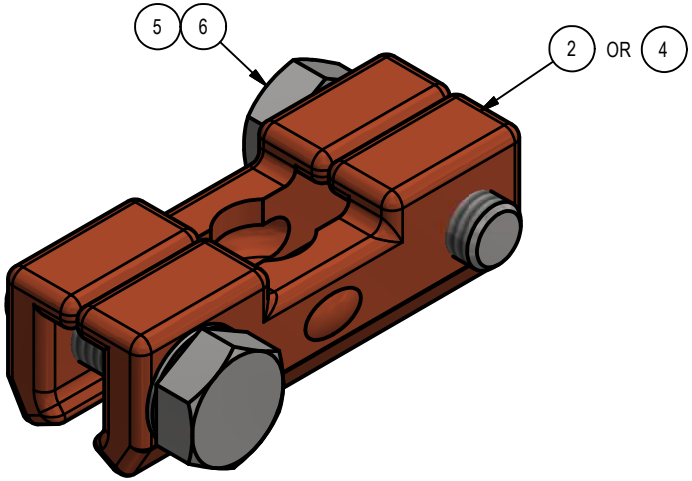
Arrester disconnector		
z) length of the lead		mm
aa) diameter of the lead		Mm
bb) material of the lead		
Mechanical behaviour		
cc) Bending load at breaking point within 30s-90s		N
dd) Tensile load at breaking point within 30s-90s		N



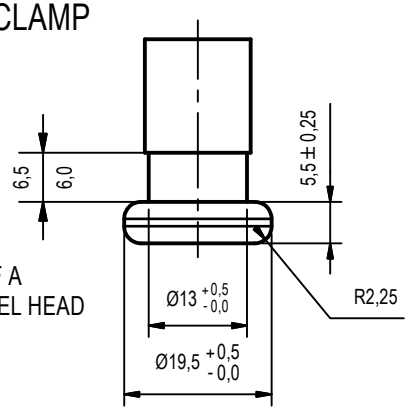
LARGE SWIVEL CLAMP



EXAMPLE OF A
LARGE SWIVEL HEAD



SMALL SWIVEL CLAMP



EXAMPLE OF A
SMALL SWIVEL HEAD

NOTES
1. CLAMP MUST BE DESIGNED IN ACCORDANCE WITH SPECIFICATION CEE-0063
2. ONLY CRITICAL DIMENSIONS ARE PROVIDED IN THE DETAIL SHEETS. MANUFACTURER DETERMINE DETAIL DESIGN.

ITEM NO.	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
6	LOCKING WASHER, STAINLESS STEEL TO SPEC AISI GR 304. INTERNALLY TOOTHED, M10	2 PER CLAMP	-	-
5	MACHINE SCREW, STAINLESS STEEL TO SPEC AISI GR 304 . HEX M10	2 PER CLAMP	-	-
4	107mm² CONTACT WIRE CLAMP FOR SMALL SWIVEL HEAD.	2	54028819	BBH3656 SHT 4
3	107mm² CONTACT WIRE CLAMP FOR LARGE SWIVEL HEAD.	2	54011591	BBH3656 SHT 3
2	161mm² CONTACT WIRE CLAMP FOR SMALL SWIVEL HEAD.	2	54033583	BBH3656 SHT 2
1	161mm² CONTACT WIRE CLAMP FOR LARGE SWIVEL HEAD.	2	54011643	BBH3656 SHT 1

DIMENSIONS : mm SCALE : NTS
TOLERANCE : LIN ± - ANG ± - ITEM NO : -
MATERIAL : -

VERSION INFO : DIMENSIONS CHANGED

03/03/2021
APPROVED : W SCHOEMAN

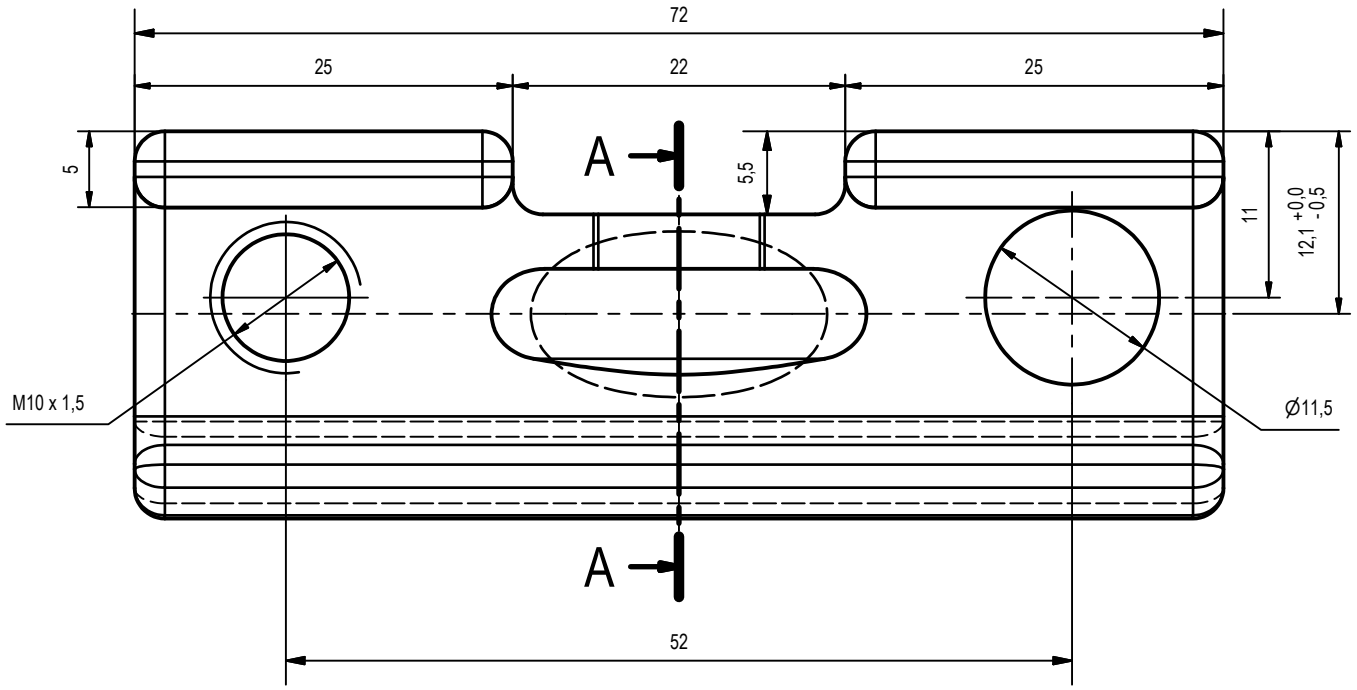
2021-03-03
AUTHORISED : L O BORCHARD

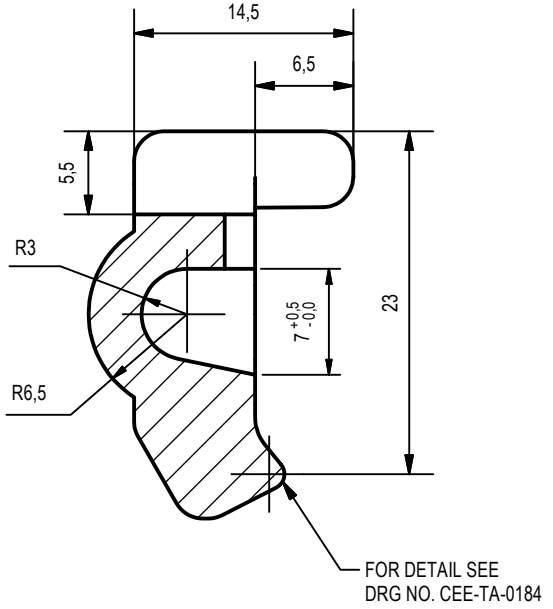
CONTACT WIRE, SWIVEL CLAMP FOR 107mm² AND 161mm² CONTACT WIRE FOR SMALL AND LARGE SWIVEL HEADS

TRANSNET freight rail

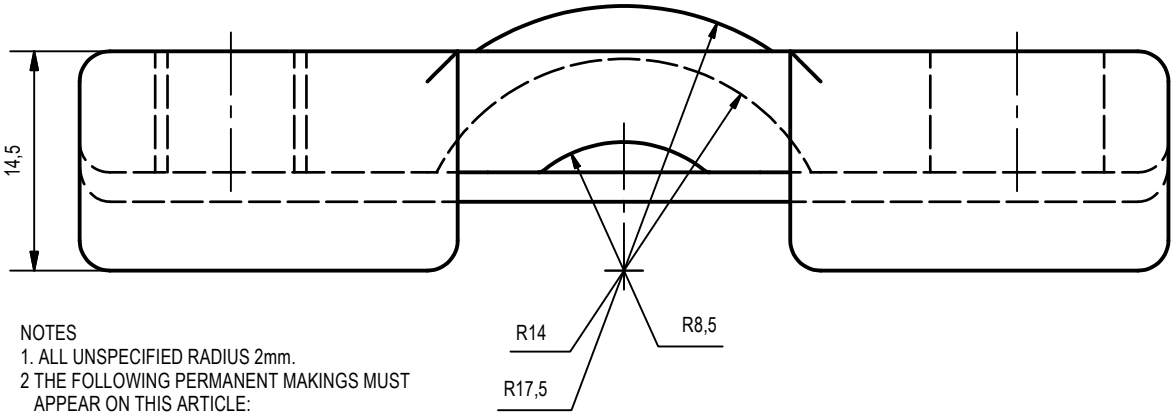
BBH3656
VERSION 3 A4

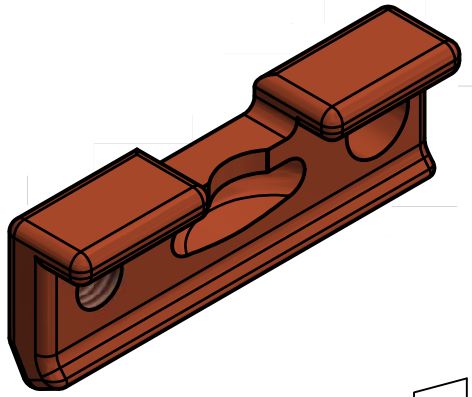
DO REF : CDO/E0097 ECP REF : - DRAWN : D HATTINGH DESIGNED : - CHECKED : D HATTINGH





SECTION A-A





NOTES
1. ALL UNSPECIFIED RADIUS 2mm.
2 THE FOLLOWING PERMANENT MAKINGS MUST APPEAR ON THIS ARTICLE:
(a) TRANSNET LOGO.
(b) MAKER'S IDENTIFICATION.
(c) DATED BATCH NUMBER.
(d) CONTACT WIRE SIZE.
(e) TORQUE VALUE OF 40N.m.

DIMENSIONS	: mm	SCALE	: 2 : 1
TOLERANCE	: LIN ± 0,5	ANG ± 0,5°	ITEM NO : -
MATERIAL	: Cu-Ni-Si TO SPEC CEE-0063 ALT STAINLESS STEEL TO SPEC AISI GR 304		
DRAWN : D HATTINGH		CHECKED : D HATTINGH	

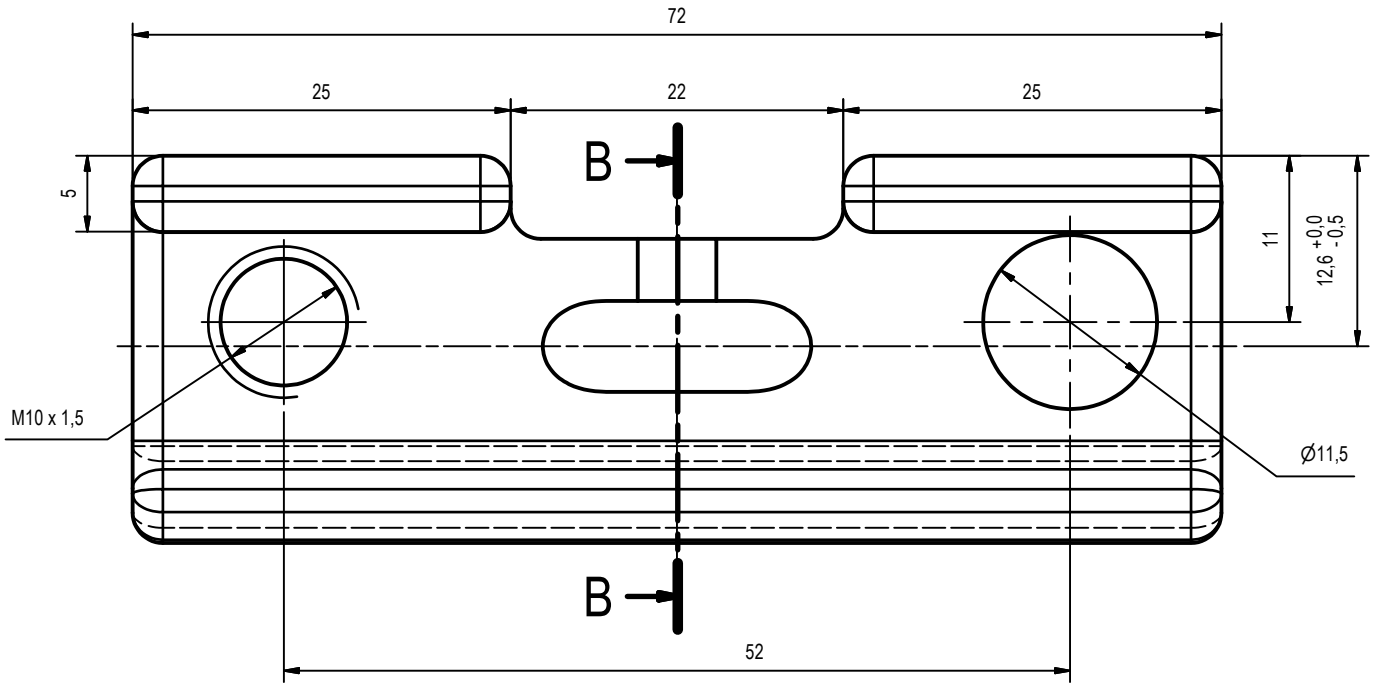
CLAMP
161mm² Cu CONTACT WIRE FOR LARGE SWIVEL HEAD

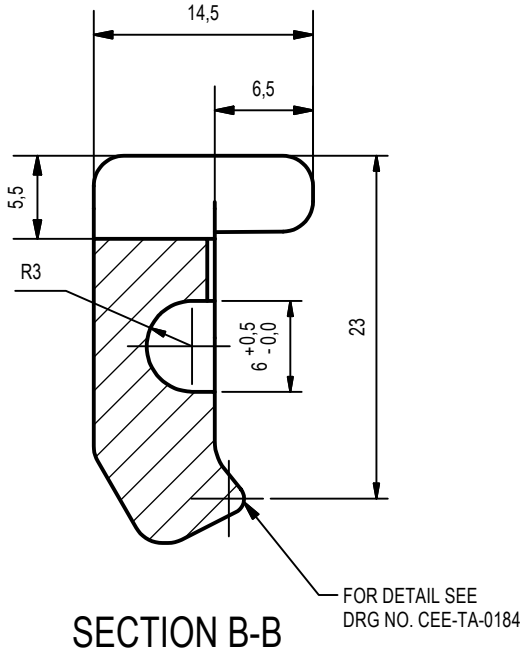
TRANSNET freight rail

BBH3656 SHT 1

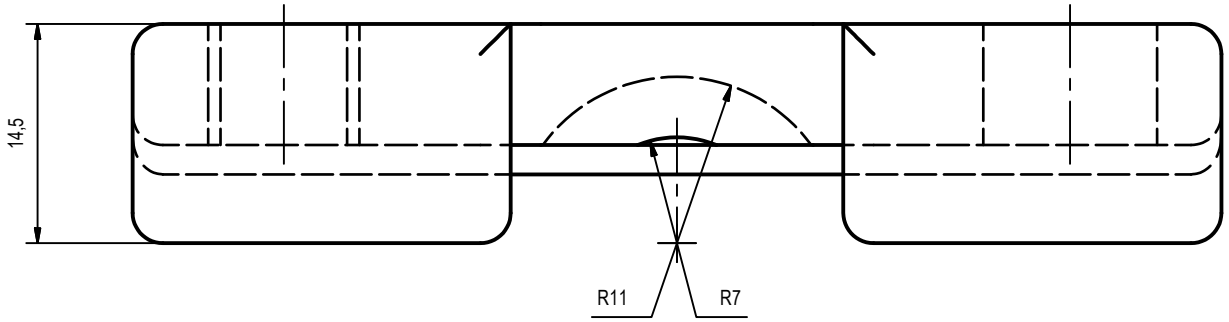
VERSION 3

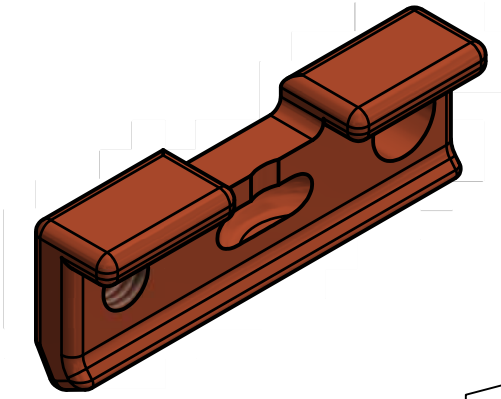
A4





SECTION B-B





NOTES
1. ALL UNSPECIFIED RADIUS 2mm.
2 THE FOLLOWING PERMANENT MAKINGS MUST APPEAR ON THIS ARTICLE:
(a) TRANSNET LOGO.
(b) MAKER'S IDENTIFICATION.
(c) DATED BATCH NUMBER.
(d) CONTACT WIRE SIZE.
(e) TORQUE VALUE OF 40N.m.

DIMENSIONS	: mm	SCALE	: 2 : 1
TOLERANCE	: LIN ± 0,5	ANG ± 0,5°	ITEM NO : -
MATERIAL	: Cu-Ni-Si TO SPEC CEE-0063 ALT STAINLESS STEEL TO SPEC AISI GR 304		
DRAWN : D HATTINGH		CHECKED : D HATTINGH	

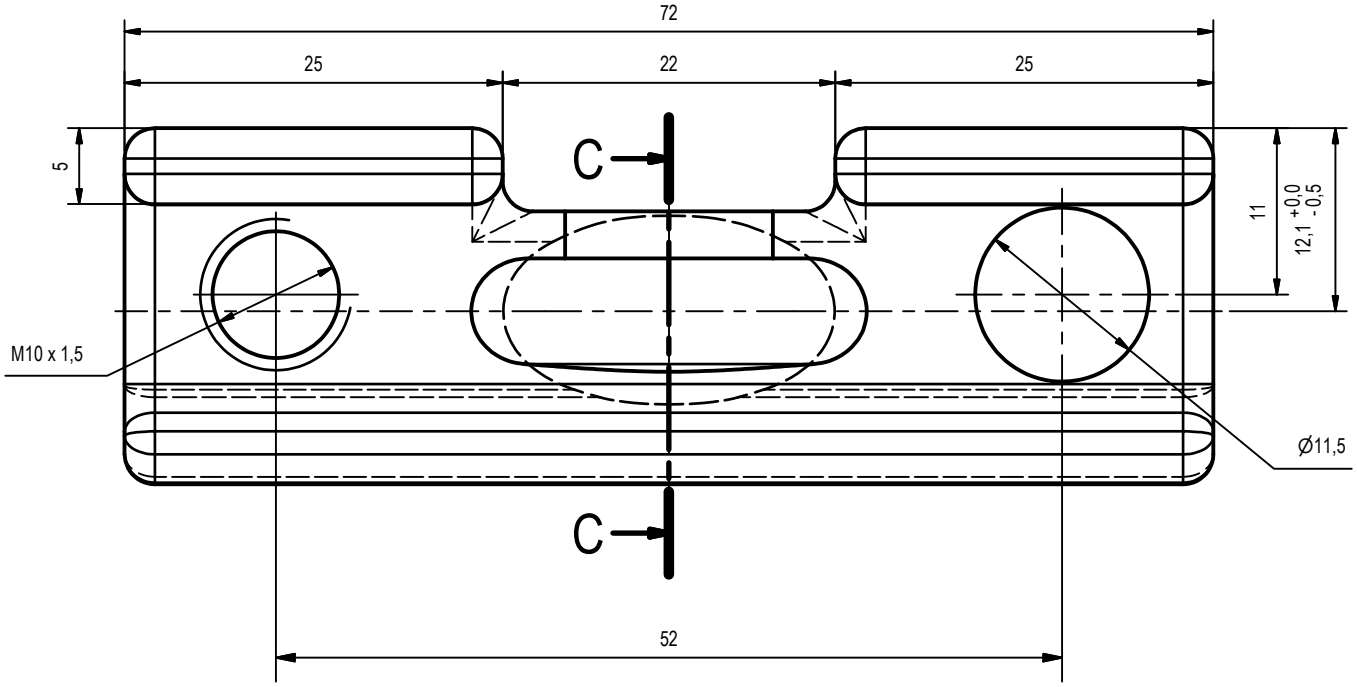
CLAMP
161mm² Cu CONTACT WIRE FOR SMALL SWIVEL HEAD

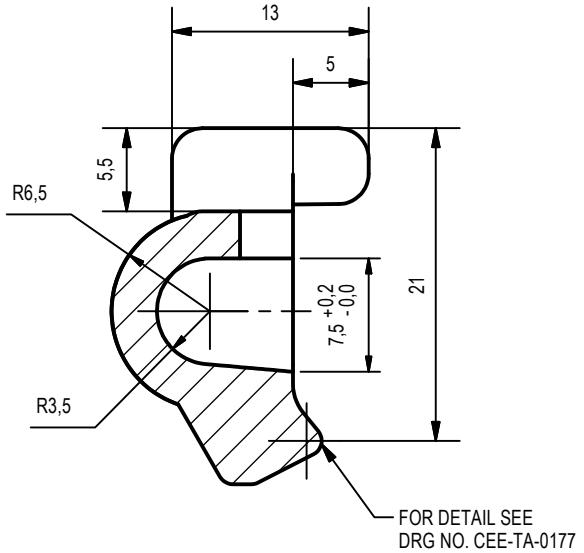
TRANSNET freight rail

BBH3656 SHT 2

VERSION 3

A4





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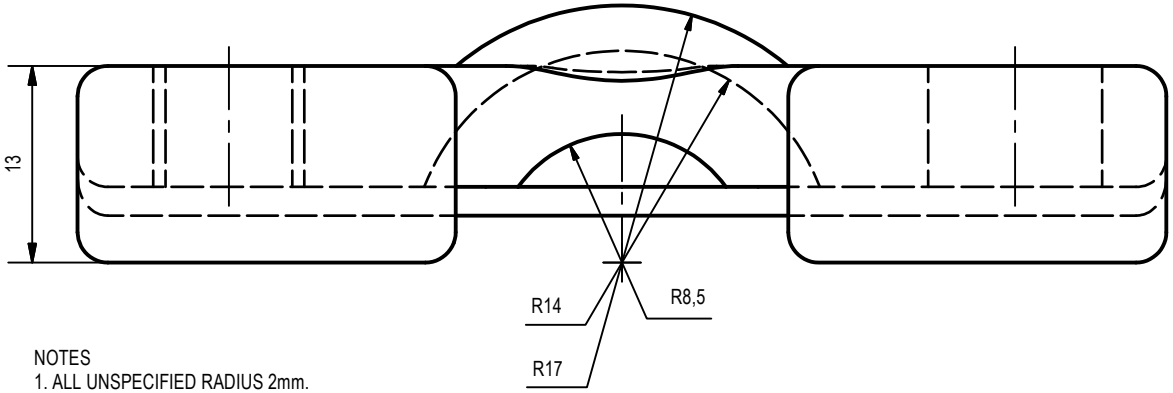

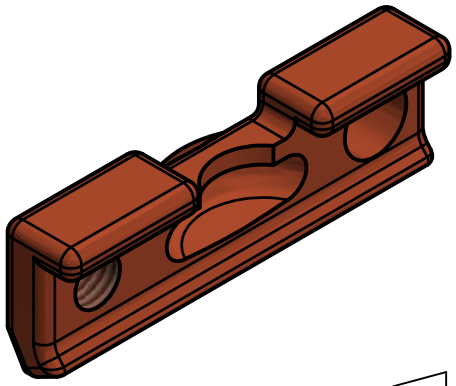

NOTES
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(a) TRANSNET LOGO.
(b) MAKER'S IDENTIFICATION.
(c) DATED BATCH NUMBER.
(d) CONTACT WIRE SIZE.
(e) TORQUE VALUE OF 40N.m.

DIMENSIONS	: mm	SCALE	: 2 : 1
TOLERANCE	: LIN ± 0,5	ANG ± 0,5°	ITEM NO : -
MATERIAL	: Cu-Ni-Si TO SPEC CEE-0063 ALT STAINLESS STEEL TO SPEC AISI GR 304		
DRAWN : D HATTINGH		CHECKED : D HATTINGH	

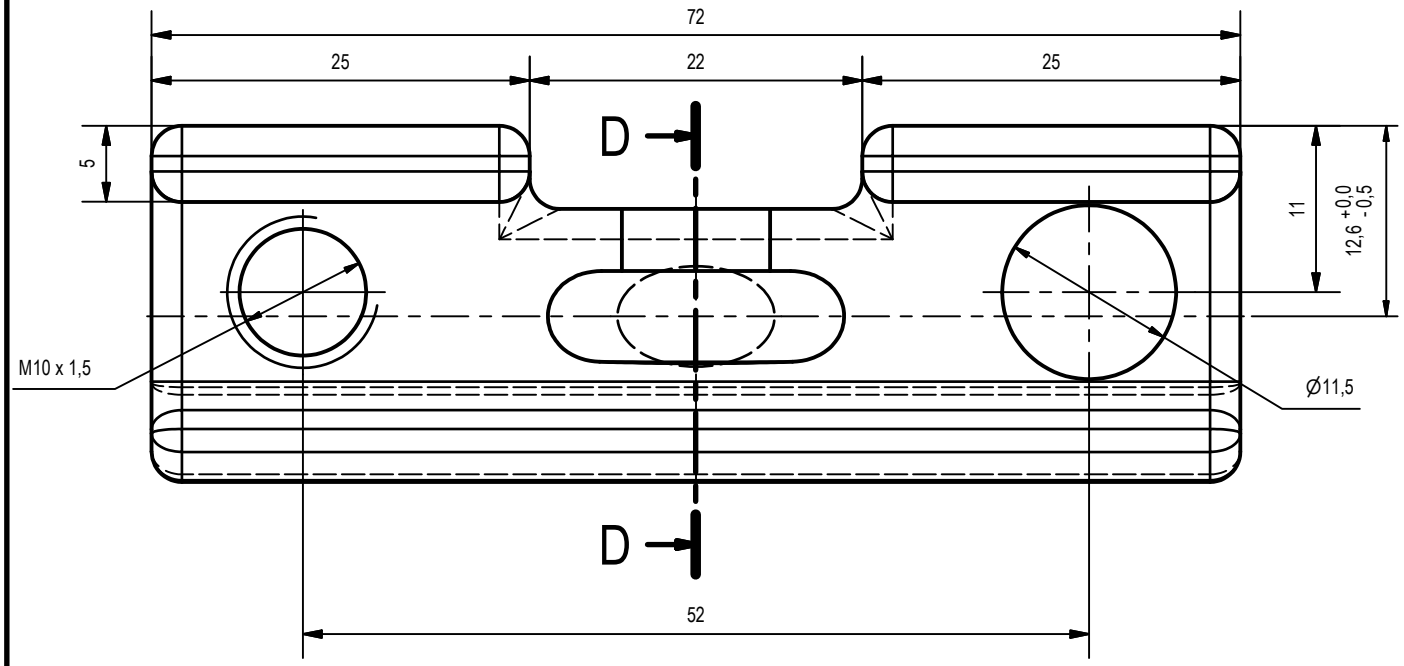
CLAMP
107mm² Cu CONTACT WIRE FOR LARGE SWIVEL HEAD

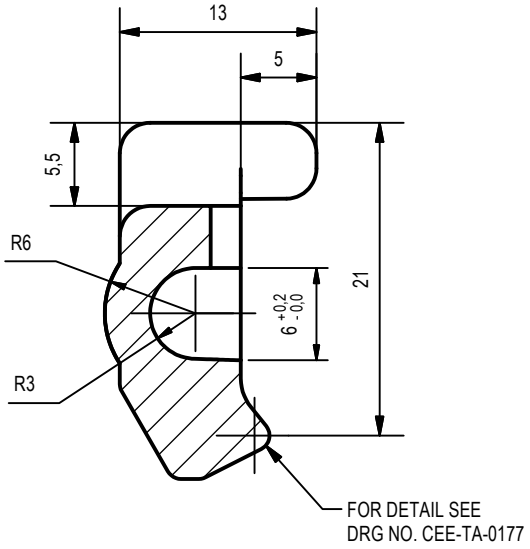
TRANSNET freight rail

BBH3656 SHT 3

VERSION 3

A4





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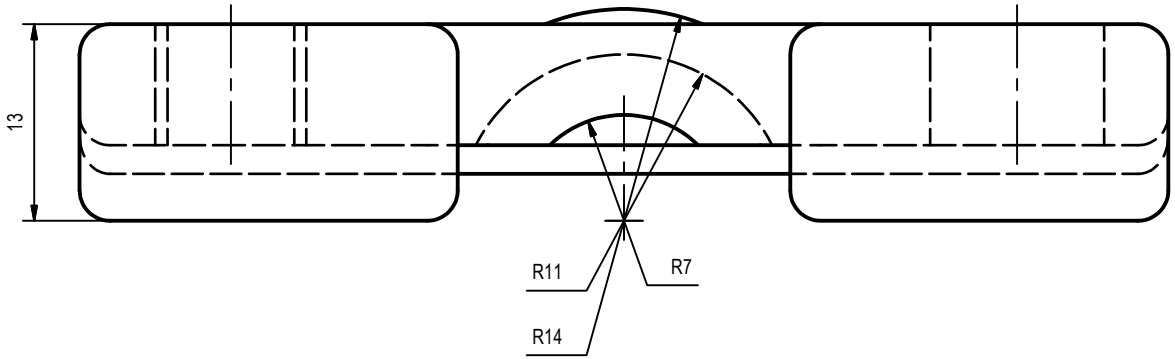

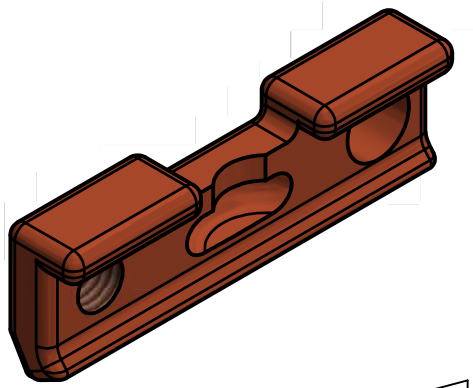

NOTES
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(c) DATED BATCH NUMBER.
(d) CONTACT WIRE SIZE.
(e) TORQUE VALUE OF 40N.m.

DIMENSIONS	: mm	SCALE	: 2 : 1
TOLERANCE	: LIN ± 0,5 ANG ± 0,5°	ITEM NO :	-
MATERIAL	: Cu-Ni-Si TO SPEC CEE-0063 ALT STAINLESS STEEL TO SPEC AISI GR 304		
DRAWN : D HATTINGH		CHECKED : D HATTINGH	

CLAMP
107mm² Cu CONTACT WIRE FOR SMALL BALL SWIVEL HEAD

TRANSNET freight rail

BBH3656 SHT 4

VERSION 3

A4

TRANSNET freight rail

A Division of SOC Transnet Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

SPECIFICATION FOR SECTION INSULATORS FOR 25 KV AC OVERHEAD TRACK EQUIPMENT FOR BOTH HIGH AND LOW SPEED TRAFFIC

Author:	Technician In Training Technology Management	M.R Masupha	
Approved:	Engineer Technology Management	S. Smith	
Authorised:	Senior Engineer Technology Management	L.O Borchard	

Date: 13 July 2016

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Transnet Freight Rail

Transnet and Relevant Third Parties

INDEX

1.0 SCOPE

1.1 This specification covers the Transnet Freight Rail requirements for bi-directional 25 kV AC section insulators, excluding catenary insulation.

1.2 A section insulator is an in-line insulator inserted into the contact wire which is so designed as to electrically separate sections of OHTE and also provide a smooth transition for a pantograph current collection. Both insulator material and air clearance have an effect on insulation properties.

2.0 REFERENCES

2.1 Unless otherwise specified, all materials, equipment and testing methods shall comply with the current edition of the relevant IEC, SANS or Transnet Freight Rail publications where applicable.

2.2 The following specifications and drawings (latest edition) are referred to herein:

2.3 AMERICAN STANDARD AND TEST METHODS (ASTM)

ASTM D2303-97: 2004	Standard Test Methods for Liquid Contaminant, Inclined-Plane, Tracking and Erosion of Insulating Materials.

2.4 SOUTH AFRICAN NATIONAL STANDARDS (SANS)

SANS 60383-2:	Insulators for overhead lines with a nominal voltage above 1 000 V Part 2.

2.5 TRANSNET FREIGHT RAIL SPECIFICATIONS

Transnet Drawing CEE-TA-0062:	Standard Electrification Symbols.

2.6 SIEMENS DRAWING

Siemens Drawing No. 8WLO 119-6ZG30:	Pantograph for AC/DC locomotive.

3.0 METHOD OF TENDERING

3.1 Tenderers shall indicate clause-by-clause compliance with this specification. This shall take the form of a separate document listing all the specifications clause numbers indicating the individual statement of compliance or non-compliance. This document can be used by tenderers to elaborate on their response to a clause.

3.2 A statement of non-compliance shall be motivated by the tenderer.

3.3 Tenderers shall submit descriptive literature consisting of a detailed technical `specifications, general constructional details and principal dimensions, together with clear illustrations of the equipment offered.

3.4 Failure to comply with clauses 3.1, 3.2 and 3.3 could preclude a tender from consideration.

4.0 SERVICE CONDITIONS

4.1 ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level
Relative humidity:	10% to 90%
Ambient temperature:	-10° C to +50° C

Wind pressure:	750 Pa
Lightning conditions:	20 ground flashes/km^2 per annum
Pollution:	Heavily salt laden with industrial pollutants including diesel- electric locomotive emission.

4.2 MECHANICAL CONDITIONS

Contact wire tension (new wire):	11 kN (min) to 19.5 kN (max.)
Required safety factor (overall):	x2 for 107 mm^2 contact wire x2.7 for 161 mm^2 contact wire.
Contact wire size:	107 mm^2 or 161 mm^2 Cu

4.3 ELECTRICAL CONDITIONS

Highest voltage of system:	30 kV AC
Lowest voltage of system:	19.9 kV AC
Maximum commutated current:	800 A
Maximum short circuit current:	8000 A
Lightning impulse withstand voltage:	95 kV

Note: The circuit breakers opening time on the occurrence of a fault is 60-150 milliseconds for 25 kV AC.

5.0 DRAWINGS AND INSTRUCTIONS

5.1 All drawings must use standard symbols as per CEE-TA-0062.

5.2 Tenderers shall provide the following information at time of tendering to enable a proper adjudication to be made. Failure to do so shall be indicated in the "Statement of Compliance" and may lead to rejection of the tender. Where feasible the information may be provided on the drawing:

5.2.1 A detailed drawing showing insulation inserts, runners, arcing horns and suspension arrangements with all relevant dimensions and in particular deviation, if any, from a plane surface after installation. (See clause 6 for design requirements.)

5.2.2 Details of insulating materials used. Resistance to Ultra-violet radiation shall be stated.

5.2.3 Detail and composition of metallic components used.

5.2.4 Minimum distance to be allowed between section insulator and catenary.

5.2.5 Details of adjusting height and level at rights angles, as well as longitudinal, to the track.

5.2.6 Gross mass.

5.2.7 Details of adjustment of arcing horns.

5.2.8 Comprehensive instructions for installation and details of any special tools or equipment required.

5.2.9 List of railway organisations and service conditions where the section insulator offered, is in successful use.

5.2.10 Test certificates for tests called for in clause 7.2.

5.3 Photocopies of original documentation shall be clearly legible.

6.0 DESIGN REQUIREMENTS

6.1 The section insulators shall be of durable design and shall be capable of carrying out their functions reliably under the service conditions stated. They shall be suitable for bi-directional traffic at speeds of up to120 km/h.

6.2 The overall mass of the section insulator shall not exceed 21 kg. (The mass of support droppers and fittings excluded.)

6.3 The overall width of that part of the section insulator in contact with the pantograph shall not exceed 330 mm.

6.4 The section insulator shall be provided with suitable runners of either metal or insulating material such that a smooth continuous running surface is present for the passage of a pantograph,

6.5 The design shall be such that electrical contact between pantograph and the overhead system will under no circumstances be completely broken whilst being traversed by the pantograph. Designs incorporating a gap longitudinally across the section insulator (i.e. with in-line runners) the gap width shall not exceed 300 mm such that the gap can be bridged out by the pantograph. (See Appendix 1 for a detailed drawing of a pantograph).

6.6 Allowance shall be made in the design to ensure that no obstruction shall be formed to the passing pantograph should the section insulator fail to be set perfectly level in all planes with respect to the track.

6.7 The section insulator shall preferably present a perfectly plane running surface to the pantograph, when installed at the normal tension of 14.5 kN. If not perfectly plane, or if variations in tension can result in deviations from a perfect plane, the maximum allowable deviation shall be 6 mm at any point on the running surface, within the range of operating tensions quoted in clause 4.2.

6.8 All runners or parts in contact with the pantograph shall be of rigid design such that no part shall deflect by more than that specified in clause 6.7 whilst being subjected to the upward force of the pantograph of up to 90 N.

6.9 Arcing horns shall be provided and designed such to assist in extinguishing any arc. They shall also be placed such that the insulation used will not be damaged by the arcs drawn during operation and shall be of rigid design. The air-gap between arcing horns at different potential shall not be less than 150 mm. Each horn shall have a straight length above this air gap between 120 mm to 350 mm.

6.10 The main insulating material forming the insulation between the two circuits shall have a creepage length greater than 750 mm. It shall also be able to withstand abrasion resulting from the passage of pantographs (if applicable) as well as electric arcing and ultra-violet radiation.

P.T.F.E. (Teflon) shall not be used if in direct contact with the pantograph.

6.11 Where composite insulators are used as main insulation the protective coating on the outside shall be bonded to the core such that no cavities are formed between the coating and the core. The protective coating shall be sealed at the ends to prevent the possibility of tracking along the insulator underneath the protective coating.

Each insulator of this type shall be subjected to the water immersion test described in clause 7.3.

6.12 Clause 6.11 also applies to any other protection material provided to protect the insulation against arcing/flashover.

6.13 Supporting droppers shall (if provided) be insulated to prevent any arcing between the catenary wire and the droppers. The supporting droppers shall be adjustable either by means of turnbuckles or some other means of providing fine adjustments to its length. Droppers shall be protected by thimbles or similar means to prevent wear taking place at sharp edges.

6.14 Supporting droppers must be provided if the mass of the section insulator exceeds 5 kg or if its overall width is in excess of 75 mm.

6.15 Supporting droppers shall be of material type stainless steel.

6.16 Only non-corrosive materials shall be used in the construction of the section insulator. Brass may not be used.

6.17 Means of locking all bolts and screws shall be provided. All screw threads shall be of metal.

7.0 TESTS

7.1 GENERAL

7.1.1 The first section insulator shall be subjected to type tests as specified in clauses 7.2.

7.1.2 All main insulators of the composite type shall be subjected to the routine test as specified in clause 7.3.

7.1.3 A further five samples of the main insulator material shall be subjected to the type test as specified in clause 7.2.1.

7.1.4 The responsibility for arranging these tests shall rest with the tenderer although the Transnet Freight Rail reserves the right to perform such tests independently.

7.1.5 Transnet Freight Rail reserves the right to call for further type tests.

7.1.6 Transnet Freight Rail reserves the right to be present at all tests.

7.2 TYPE TESTS

7.2.1 The insulating material (if of synthetic type) shall be tested for resistance to tracking in accordance with the test method described in ASTM D 2303. The average time to track 13 mm for five samples shall not be less than 24 hours at a constant test voltage of 2 kV with a constant contaminating flow rate as prescribed in ASTM D 2303. The cabinet in which the tracking test is performed shall be open at the top in order to create sufficient ventilation, thus limiting the relative humidity inside the chamber to a value that will not give false results. The flow rate of the contaminant should be accomplished by a gravity feed from a large reservoir mounted at a sufficient height to obtain the desired flow rate.

7.2.2 Impulse and power frequency tests shall be carried out on a complete section insulator in accordance with SANS 60383-2.

7.2.3 Mechanical load tests shall be carried out to establish whether the section insulator can withstand the maximum tension called for in clause 4.2 at a safety factor as specified in clause 4.2.

7.3 Water immersion tests shall be carried out as follows: (Routine test)

7.3.1 Immerse the sample in hot tap water (50 °C) and allow water to cool over 8 hours to approximately 20°C.

7.3.2 Repeat 7.3.1 nine times.

7.3.3 After the 10th cycle, remove the sample from the water, wipe the surface dry with a paper towel and apply a DC test voltage of 25 kV/m length of insulator within 10 minutes. Measure the current after one minute on a DC ammeter capable of reading 1 nA.

7.3.4 Insulators conducting more than 100 nA have failed the test and must be rejected.

8.0 SPARES

8.1 Tenderers shall quote separately for the following spares:

8.1.1 Arcing horns

8.1.2 Main insulators

8.1.3 Metal runners (if not integrated with arcing horns)

8.2 The following information shall be made available for spares:

8.2.1 Complete ordering description

8.2.2 Name of manufacturer

8.2.3 Catalogue description number

8.2.4 Type and ordering number

9.0 TOOLS

9.1 Special tools for installation of the section insulators shall be quoted separately, but must be clearly stated in tender that the tool is required for installation.

10.0 PACKING

10.1 Each section insulator shall be packaged individually complete with arcing horns, suspension fittings, etc.

11.0 WARRANTEE/ AFTER SALES SUPPORT

11.1 Tenderers should give a warrantee on the workmanship of the manufactured items and provide a full disclosure of any warrantee conditions with the tender.

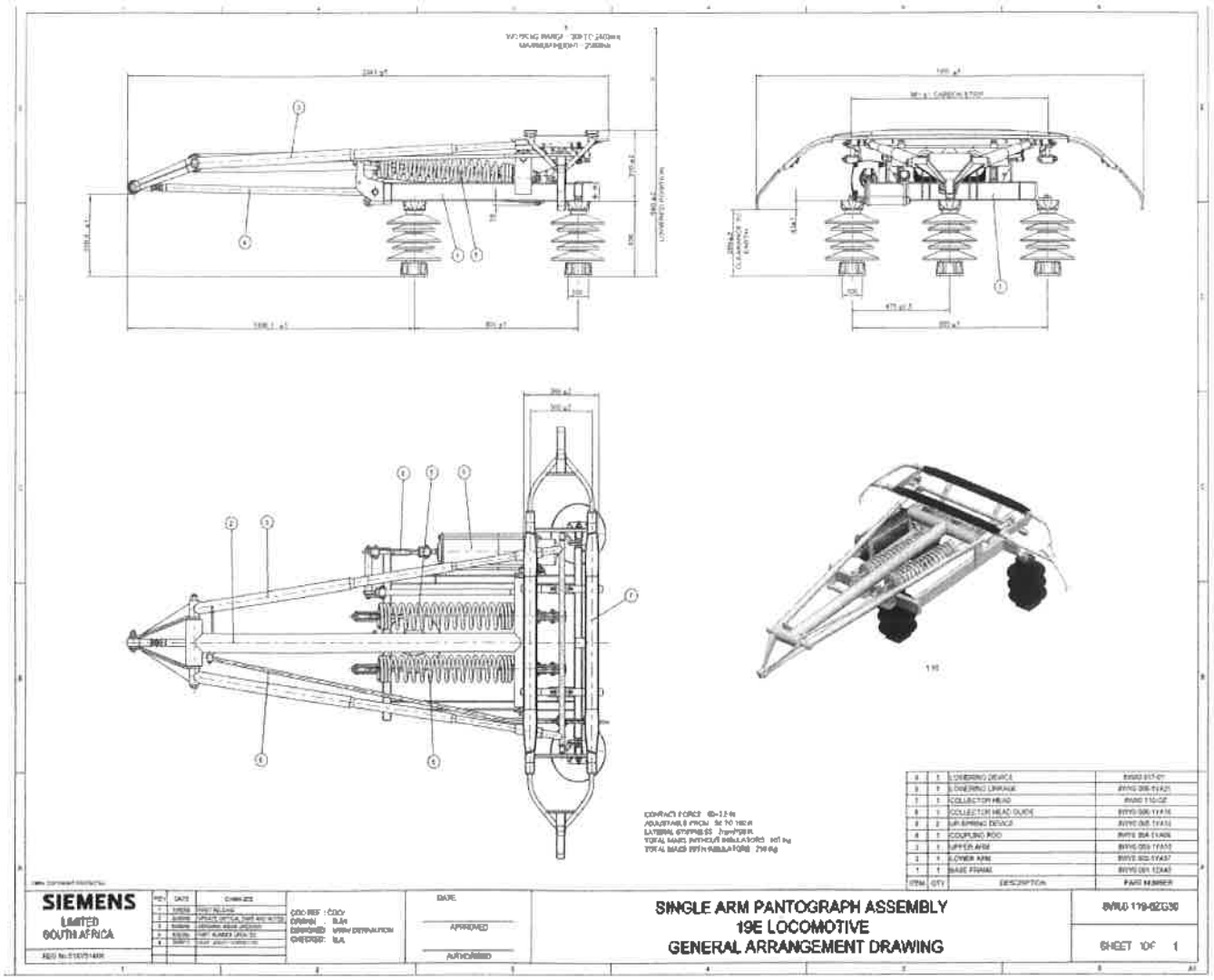
11.2 Tenderers should state the extent of after sales support provided by them.

11.3 Tenderers should provide a spare parts list with contact details with each item , including the installation instructions.

11.5 Lead time must be clearly indicated by tenderers.

END

Appendix 1


SIEMENS
LIMITED
SOUTH AFRICA
SINGLE ARM PANTOGRAPH ASSEMBLY
19E LOCOMOTIVE
GENERAL ARRANGEMENT DRAWING
SHEET 1OF 1

A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

SPECIFICATION FOR NON—FERROUS MATERIALS FOR ITEMS USED ON OVERHEAD TRACK EQUIPMENT

Author:	Chief Engineering Technician Technology Management	W J Schoeman	
Approved/Authorised:	Principal Engineer Technology Management	S E Sibande	
		Date:	16 April 2021

Circulation Restricted To:

Transnet and Relevant Third Parties

"I acknowledge that this application contains personal information as defined in the Protection of Personal Information Act, 2013 (the "Act"). By accessing/using this application, I consent to the processing of my personal information in accordance with the requirements of the Act. I acknowledge that I cannot unreasonably withhold my consent. I acknowledge that the purpose for processing my personal information is in terms of this application."

LIST OF AMENDMENTS TO THE SPECIFICATION

Version No.	Date Issued	Clause No.	Page No.	Remarks
	26/09/2014			Updated format. Remove DZR brass as material type. Inserted a Cu-Ni-Si material specification. Included Stainless steel as alternative material for bolts and nuts. Updated Drawing list.
	28/03/2019			Updated format. Changed Cu-Ni-Si material composition to IEC standard CW112. Added Aluminium and Bi-metal material specifications. Removed Copper Alloy bolts and screws from table 1. Removed redundant references. Changed details of testing, removed billet testing and included finished product testing. Updated Drawing list in appendix. Removed tensile testing due to restriction on testing to SANS 6892-1 – completed product dimensions too small.
	February 2021	2 6 8 9 10 13	4.0 5.4 8.0 9.0 15.0	Updated format. Added Background. Standardize Hardness on Aluminium clamps. Updated Additional Information Required. Changed Required control test pieces. Updated Method Of Tendering. Added Annexure A & B.
	April 2021	8	6.2.1	Replace N-m with kN

TABLE OF CONTENTS

1.0 SCOPE

1.1 This specification details Transnet Freight Rail's requirements for the supply of non-ferrous items for conductive clamps/splices/clips used in the Overhead Traction Equipment (OHTE) such as:

a) Contact wire splicers,

b) Contact wire swivel clips,

c) Parallel clamps,

d) Feeder clamps,

e) Bi-metal clamps,

f) Runner clamps,

g) Dropper clips.

This specification must be read in conjunction with each individual item's drawing specified in Appendix 1

1.2 Appendix 1 contains a table of component drawings. Note that additional drawings may exist that is not in the list. Conductive items not mentioned above may reference this specification. Any drawing referencing this specification without specifying the type of material, must by default be accepted to refer to Cu-Ni-Si as the material type. If any confusion exist written conformation must be requested from Transnet Freight Rail – Technology Management Electrical department.

1.3 This specification contains schedule of requirements (Annexure A) which must be completed by the relevant Transnet Representative.

1.4 This specification contains technical datasheet (Annexure B) which must be completed by the tenderer and must be submitted as part of the tender documents.

2.0 BACKGROUND

2.1 The overhead track equipment (OHTE) is supply by a 3kV DC, 25kV AC and 50kV systems. Various non-ferrous clamps (Aluminium, copper and conductive alloys) are used to connect the different types of overhead conductors with each other.

3.0 NORMATIVE REFERENCES

Unless otherwise specified all materials used, equipment developed and supplied shall comply with the latest edition of the relevant British Standards (BS EN), International Organization for Standardization (ISO), ASTM International (American Society for Testing and Material). South African National Standards (SANS) or Transnet publications.

3.1 BS-EN STANDARDS:

3.1.1 BS EN 573-3 Aluminium and aluminium alloys – Chemical composition and form of wrought products.

3.1.2 BS EN 12165 Coper and copper alloys – Wrought and unwrought forging stock.

3.2 ASTM INTERNATIONAL

3.2.1 ASTM A240 Standard Specification for Chromium and Chromium –Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

3.3 ISO STANDARD:

3.3.1 ISO 2859 Sampling procedures for inspection by attributes.

3.3.2 ISO 9001 Quality Management systems

3.4 SANS STANDARD:

3.4.1 SANS 1700-1-1 Fasteners Part 1: Terminology and nomenclature Section 1: Bolts, screws, nuts and accessories

3.4.2 SANS 1700-5-8 Fasteners Part 5: General requirements and mechanical properties Section 8: Mechanical properties of corrosion-resistant stainless-steel fasteners - Bolts, screws and studs

3.4.3 SANS 6506 Metallic materials - Brinell hardness test

4.0 SERVICE CONDITIONS

4.1 ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level
Relative humidity:	10% to 90%
Ambient temperature:	-10° C to +55° C
Wind pressure:	750 Pa
Lightning conditions:	20 ground flashes/km2 per annum
Pollution:	Heavily salt laden with industrial pollutants
	including diesel- electric locomotive emissions.

4.2 MECHANICAL SERVICE CONDITIONS

4.2.1 OHTE will be subjected to intermittent vibrations due to train traffic on the rail system. All fastening components should be chosen accordingly.

4.3 ELECTRICAL SERVICE CONDITIONS

4.3.1 Unless otherwise specified on component drawings, components will be installed on either 3kVDC, 25 kV AC or 50 kV AC overhead traction power systems.

5.0 TECHNICAL REQUIREMENTS- MATERIAL

5.1 MATERIAL

5.1.1 For conductive purposes materials used are Copper, Copper Alloy (Cu-Ni-Si), Aluminium, Aluminium Alloy and stainless steel. Nuts, bolts and washers completing component assemblies shall be of stainless steel.

5.2 COPPER

5.2.1 Pure copper is used only for bi-metallic liners on aluminium to date. The material specification shall be on the component drawing.

5.3 Cu-Ni-Si (COPPER ALLOY)

5.3.1 The material used in the manufacture of all fittings of a Copper-Nickel-Silicon alloy (Cu-Ni-Si) shall have the chemical composition and mechanical properties specified hereunder:

Table 1: Composition to CW112C of BS EN 12165

Composition	All Cu-Ni-Si items
Nickel	2.6 – 4.5 %
Silicon	0,8 – 1,3 %
Others Total	0,5 % (maximum)
Copper	Remainder minimum of 93.7

Table 2. Mechanical Properties

Mechanical Properties	All Cu-Ni-Si items
Hardness [HB]	170 (minimum) for splicers, 130 (minimum) for bi-metal clamps, 150 (minimum) all other items.

5.3.2 In order to obtain the mechanical properties specified in clauses 5.3.1 above, the alloy specified requires heat treatment which shall be determined by the manufacturer.

5.3.3 Each batch shall be marked for identification and recorded on related records as per ISO 9001.

5.3.4 The control test pieces representing the finished product in the fully heat-treated condition shall have the mechanical properties as stipulated in clause 5.3.1.

5.4 ALUMINIUM

5.4.1 The material used in the manufacture of all fittings of an Aluminium shall have the chemical composition and mechanical properties specified for EN AW - 6063 grade Aluminium according to BS EN 573-3. Additional electrical and mechanical properties may be specified on component drawings.

Table 3: Composition to 6063 of BS EN 573-3

Composition	All Aluminium items
Magnesium	0.45 – 0.90 %
Silicon	0.2 – 0.6 %
Iron	< 0.35 %
Others Total	0,65 % (maximum)
Aluminium	Remainder minimum of 97.5

Table 4: Mechanical Properties

Mechanical Properties	All Aluminium items
Hardness [HB]	50 (minimum)

5.4.2 Aluminium grade 6063 has various equivalent specifications, the following standard is known to be equivalent:

i. (The Aluminium Association) AA 6063

ii. Numerous equivalent standards exist as long as the properties of table 3 and 4 are met these standards may be used at the manufacturers risk.

5.4.3 In order to obtain the mechanical properties specified in clauses 5.4.1 above, the tempering of the aluminium which be determined by the manufacturer.

5.4.4 Each batch shall be marked for identification and recorded on related records as per ISO 9001

5.4.5 The control test pieces representing the finished product in the fully heat-treated condition shall have the mechanical properties as stipulated in clause 5.4.1.

5.5 ALUMINIUM ALLOY FOR BI METAL CLAMPS

5.5.1 An aluminium alloy is used for bi-metal clamps with an aluminium body and coper liner. The material used in the manufacture of bi-metal clamps shall be based on EN AW - 6063 grade aluminium with additives to facilitate fusion of the copper inserts. Additional electrical and mechanical properties may be specified on component drawings.

Table 5: Composition of Aluminium alloy based on 6063 of BS EN 573-3

Composition	All Aluminium items
Magnesium	0.45 – 1.5 %
Silicon	0.5 – 1.2 %
Copper	0.5 – 1.5 %
Iron	< 0.5 %
Zinc	<0.5 %
Manganese	<0.2%
Others Total	0,8 % (maximum)
Aluminium	Remainder minimum of 93.8%

Table 6. Mechanical Properties

Mechanical Properties	All Aluminium items
Hardness [HB]	50 (minimum)

5.5.2 Aluminium grade 6063 has various equivalent specifications, see clause 5.4.2 of this specification.

5.5.3 In order to obtain the mechanical properties specified in clauses 5.5.1 above, the tempering of the aluminium alloy which be determined by the manufacturer.

Each batch shall be marked for identification and recorded on related records as per ISO 9001.

5.5.4 The control test pieces representing the finished product in the fully heat-treated condition shall have the mechanical properties as stipulated in clause 5.5.1.

5.6 BOLTS, NUTS AND WASHERS

5.6.1 Unless otherwise specified on the component drawing all bolts, nuts and washers shall be of material type stainless steel.

5.6.2 The hexagon headed bolts and nut shall comply with the requirements of SANS 1700-1 for definition, SANS 1700-5-8 specifies applicable designation of the stainless steel bolts.

5.6.3 The material type for bolts and nuts are Stainless Steel to specification ASTM 240 Grade 304. Where stainless steel bolts and nuts are used, a different grade of stainless steel nuts must be used to prevent the bolt and nut to cease up. ASTM 240 Grade 316 is recommended for the nut, however testing will be done to check for seizure of nuts and bolts.

Torque values for parallel clamp and feeder clamps 50 N-m thus all bolts and screws must be able to withstand 75 N-m. Runner clamps torque values are 40 N-m thus all bolts and screws must be able to withstand 60 N-m.

5.6.4 The bolts supplied with the 161 mm^2 and 107 mm^2 contact wire splicer shall be able to withstand a torque of 67 N-m. and 46 N-m. respectively, plus a safety factor of 1,5.

5.6.5 The manufacturer must ensure the length of the bolts is suitable in the application with the standard 2.5 treads free after assembly.

5.6.6 Unless otherwise specified all lock washers shall be internally toothed stainless steel washers. For contact wire splices see clause 6.2.3 of this document for washers.

6.0 DESIGN

6.1 GENERAL DESIGN

6.1.1 The various items as called for in the enquiry shall be designed in accordance with the relevant drawings as listed in Appendix 1.

6.1.2 The items shall be designed to the dimensions given on the drawings. Additional design requirements may appear on the drawings and must be adhered to.

6.1.3 Hot and cold forging is acceptable as long as the appropriate tempering is done to achieve the mechanical requirements weather stated in this specification or on the relevant drawing.

6.2 DESIGN OF CONTACT WIRE SPLICES

6.2.1 The contact wire splicer shall be suitable for joining two contact wires (to CEE-0241 and BBD 7267) in such a manner to achieve an ultimate tensile strength of 52,4 kN in the case of 161 mm^2 contact wire and 38,5 kN in the case of 107 mm^2 contact wire when fully assembled with two short pieces of contact wire.

6.2.2 Contact wire splices in their assembled form will be torqued to 67 N-m. for 161 mm^2 Cu and 46 N-m for 107 mm^2 Cu.

6.2.3 Contact wire splices shall be fitted with wedge lock washers that:

i. Are anti-vibration system ensuring no loosening in bolted joints
ii. Consists of two wedge washers with external serrations
iii. Material type stainless steel

6.2.4 Two approved manufacturers Nord Lock and Heico-Lock. Alternative manufacturers product must be first be tested and approved by Transnet Technology Management Quality Assurance

6.2 DESIGN BI-METALLIC CLAMPS

6.2.1 Bi-metallic clamps (Cu-Ni-Si with an Aluminium liner of Aluminium alloy with Copper liner) will be forged such that the liner is permanently forged to the half clamp body. No lose plates will be allowed.

6.2.2 Liner material should be at least 3mm thick for aluminium and 2mm for copper.

6.2.3 All bi-metal clamps require permanently forged liners that cannot be forcefully removed. Where necessary grooves in the clamp body may be used to improve the adhesion of the liner. No loose liners will be acceptable.

6.3 DESIGN ALUMINIUM CLAMPS

6.3.1 All aluminium and aluminium alloy clamps will have a counter sunk hex shape for the size nut specified in the drawing. It is required to enable only requiring one tool to torque the bolts during installation.

7.0 DETAILS OF REQUIREMENTS

7.1 Details of the type, size and quantity of the various items required will be furnished in the enquiry.

7.2 The relevant drawing will provide critical dimension per component.

7.3 All components must be delivered assembled with their relevant bolts, nuts and washers unless otherwise specified on the component drawings, the grade of bolts and nuts should suit the application.

7.4 Any discrepancy in requirement between the specification, component drawing or store item description, must be reported to Transnet's supply chain services (SCS) and Technology Management. A written clarification must be obtained from Technology Management Electrical department on the requirement.

8.0 ADDITIONAL INFORMATION AT TENDERING STAGE

8.1 Tenderers shall provide the source of supply of the alloy material. (Raw material)

8.2 Tenderers shall provide the name of the manufacturer (OEM) of the items as asked for in the enquiry.

9.0 TESTING AND INSPECTIONS

9.1 Transnet reserves the right to be present at all tests and inspections as called for in this clause.

9.2 The responsibility of arranging the tests called for in this clause rests with the successful tenderer.

9.3 All tests will be witnessed by Transnet Freight Rail's Technology Management (Electrical) department. Inspections will take place at the manufacturer's premises or suitable test facility, and must be organized well in advance (2 weeks prior).

9.4 Test and inspection must be conducted on each batch.

9.5 Two of the control test pieces of each batch of the complete component after heat treatment, shall be tested as detailed in SANS 6506 to verify the mechanical properties, referred to in clauses 5.3, 5.4 and 5.5, of the material of the finished product.

9.6 A Transnet Freight Rail, Technology Management (Electrical) department representative may request for any additional test deemed necessary to ensure compliance.

9.7 Test certificates in respect of these tests (9.5), shall be submitted to Transnet Freight Rail's Technology Management (Electrical), and shall state the following:

i. Chemical composition, verified by a SANAS/ILAC metallurgical accredited laboratory,
ii. Mechanical properties,
iii. Batch identification number.

9.8 Some components require a conductivity test and will be tested to the limits specified on the component's drawing.

9.9 For high tensile components such as splicers at least 1% of each batch of the splicers will be assembled and tested for tensile strength. For other component a minimum of two samples will be tested.

9.10 Tensile testing of splices, the splices will be assembled as follow:

i. Splices from clause 9.9 will be torqued from the centre bolt outward on both sides. (Torque values clause 6.2.2)
ii. Ten (10) light mallet blows will be delivered to the assembled splice.
iii. Splice will be re-torqued again to clause 9.10. This whole process repeats three (3) times.
iv. Tensile testing of clause 6.2.1 will be conducted on the assembled splices.

9.11 All conductive components with bolt assemblies will have at least 2 samples per batch assembled and torqued to the stamped torque value, three times. Each component will be inspected for fractures and deformation.

9.12 Complete assemblies will be checked for seizure of nuts and bolts.

9.13 Transnet Freight Rail reserves the right to call for a further two control test pieces to be submitted to the Transnet Freight Rail Technology Management (Electrical).

9.14 These samples and test pieces, when called for in clause 9.13, shall be specifically marked for positive identification with their associated heat-treatment batches and test certificates and shall be subjected to all tests called for in this specification.

9.15 All samples submitted for test purposes shall be excluded from those supplied in terms of the contract quantities.

10.0 MARKINGS

The items shall be permanently marked, where one item consist of more than one article each article must be permanently marked, with the following.

10.1 TRANSNET or the Transnet logo.

10.2 Wire size as indicated on the relevant drawings (except swivel clip stems).

10.3 A dated batch number.

10.4 Manufacturers name or logo.

10.5 Torque values for assemblies marked as:" Torque = <value> Nm" on larger pieces and where space is restricted "T = <value> Nm" where value is the required torque value. Splices must be marked with "Torque 3 x <value> Nm".

11.0 DOCUMENTATION REQUIREMENTS

11.1 Drawings and technical documentation shall be submitted with tender.

11.2 The manufacturer must provide one soft copy and two hard copies of the technical specification.

11.3 The manufacturer must provide one soft and two hard copy of the method of installation.

12.0 QUALITY ASSURANCE

12.1 The successful tenderer shall maintain a Quality Management System (QMS) based on or certified to ISO 9001.

13.0 PACKAGING

13.1 The items shall be packed in suitable containers such as bags or cartons. The mass of each container with contents shall not exceed 25 kg.

13.2 Each container shall have firmly attached thereto a water resistant label, on which the following shall be designated:

i. Stores item number.
ii. Name, size (if applicable) and quantity of items contained therein.
iii. Contract/Purchase order number.
iv. Other information as detailed in the Supply Chain Services (SCS) order.

14.0 GUARANTEE AND DEFECTS

14.1 The appointed tenderer shall accept liability for makers' defects, which may appear in design, material and workmanship.

15.0 METHOD OF TENDERING

15.1 Tenderer shall indicate clause-by-clause compliance document with the specification. This shall take the form of a separate document listing each of the specification's clause and sub-clause numbers, indicating the individual statements of compliance or non-compliance.

15.2 Statement of non-compliance shall be motivated by the tenderer in a letter format, as per 15.1. The letter and evidence of deviation shall be submitted as part of the tender document.

15.3 Tenderers shall submit comprehensive literature consisting of detailed technical specifications in accordance to clause 5.0 (Technical Requirements) and clause 6.0 (Design), the general constructional details and principal dimensions if not indicated on the provided Transnet

drawings, maintenance schedules if required in any of the Appendix/Annexure and datasheets if required in any of the Appendix/Annexure or in the specifications.

15.4 Any items offered in accordance with other standards will be considered at the sole discretion of Transnet. The tenderer shall supply full details stating where the item differs from these specifications as well as supplying a copy (in English) of the recognized standard specification(s) with which it complies. Any deviations must be approved by Transnet Freight Rail, Technology Management (Electrical) department in writing.

15.5 Failure to comply with clauses 15.1, 15.2, 15.3 and 15.4 could preclude a tenderer from consideration.

15.6 In the event of any conflict between the various submitted relevant documents, the order of precedence shall be, and in consultation with Transnet Freight Rail, Technology Management (Electrical Technology) department:

a) Legal and safety requirements.

b) This Specification.

END

APPENDIX 1:

This attachment contains the drawings of each components assembly drawing.

Item description	Drawing Description	Drawing number
Contact wire Splicers.	Splice, Conductor, 161mm^2 SQ Cu Contact wire – Electrification TYPES A, B, F, G, H and Coal line deviations	CEE-TNB-0021
	CONDUCTOR SPLICE ASSEMBLY 107mm SQ Cu CONTACT WIRE	CEE- TN-0405
Contact wire swivel clips/clamps	SWIVEL CLIP STEM FOR HOCKEY STICK/STEADY ARM	CEE-TND-0029
	CLAMP, ELECTRICAL, ASSEMBLY 161mm ² CONTACT WIRE	CEE-TN-0264
	SWIVEL CLIP: CONTACT WIRE: STEADY ARM:	CEE-TN-0049
	ELECTRICAL CLAMP ASSEMBLY	CEE-TND-0033
Parallel Clamps	PARALLEL HALF CLAMP FOR VARIOUS CONDUCTOR SIZES	CEE-TNB-0054
	PARALLEL HALF CLAMP FOR VARIOUS CONDUCTOR SIZES	CEE-TNB-0055
	ALUMINIUM PARALLEL CLAMP 160 MM SQ - 160 MM SQ TIGER CATENARY	BBB 0376
	ALUMINIUM PARALLEL CLAMP 500MM ALUMINIUM TO 160MM ALUMINIUM	BBG 7987
	ALUMINIUM CLAMP 800MM ALUMINIUM TO 160MM ALUMINIUM	BBG 7988
	BI-METALLIC CONDUCTOR SPLICE PARALLEL CLAMP 160 MM^2 Cu to 250MM^2 AL FEEDER	BBD 5138
	BI-METALLIC CONDUCTOR SPLICE PARRALEL CLAMP "SKUNK" CATENARY 25 KV AC ELECTRIFICATION	BBB 4185
Feeder Clamps	FEEDER CLAMP FOR 161mm SQ Cu CONTACT WIRE	CEE-TNB-0057
	CLAMP, ELECTRICAL: FEEDER CLAMP 107mm SQ CONTACT WIRE	CEE-TNB-0081
	BI-METAL FEEDER CLAMP FOR 161 mmSQ AL/107 mmSQ Cu CONTACT WIRE	BBH 0306
	BI-METAL FEEDER CLAMP FOR 161mmSQ AL/161 mmSQ Cu CONTACT WIRE	BBG 6147
Runner Clamps	CLAMP, RUNNER, ASSEMBLY: 161mm SQ & 107mm SQ Cu CONTACT WIRE	CEE-TNB-0086
Dropper Clips	DROPPER CLIP (PLATE TYPE) 80/100mm SQ CATENARY	CEE- TND-0036
	CONDUCTIVE DROPPER CLAMP'S	BBH 1331
Support Wire Clamp	CLAMP 107MMSQ CU. CONTACT WIRE SUPPORT WIRE ASSEMBLY	BBC 2604

ANNEXURE A: SCHEDULE OF REQUIREMENTS

(To be completed by Transnet Representative)

Item	Clamp/Fittings required	Drawing number and material type

Completed by:

……

Capacity

……

Signature

……

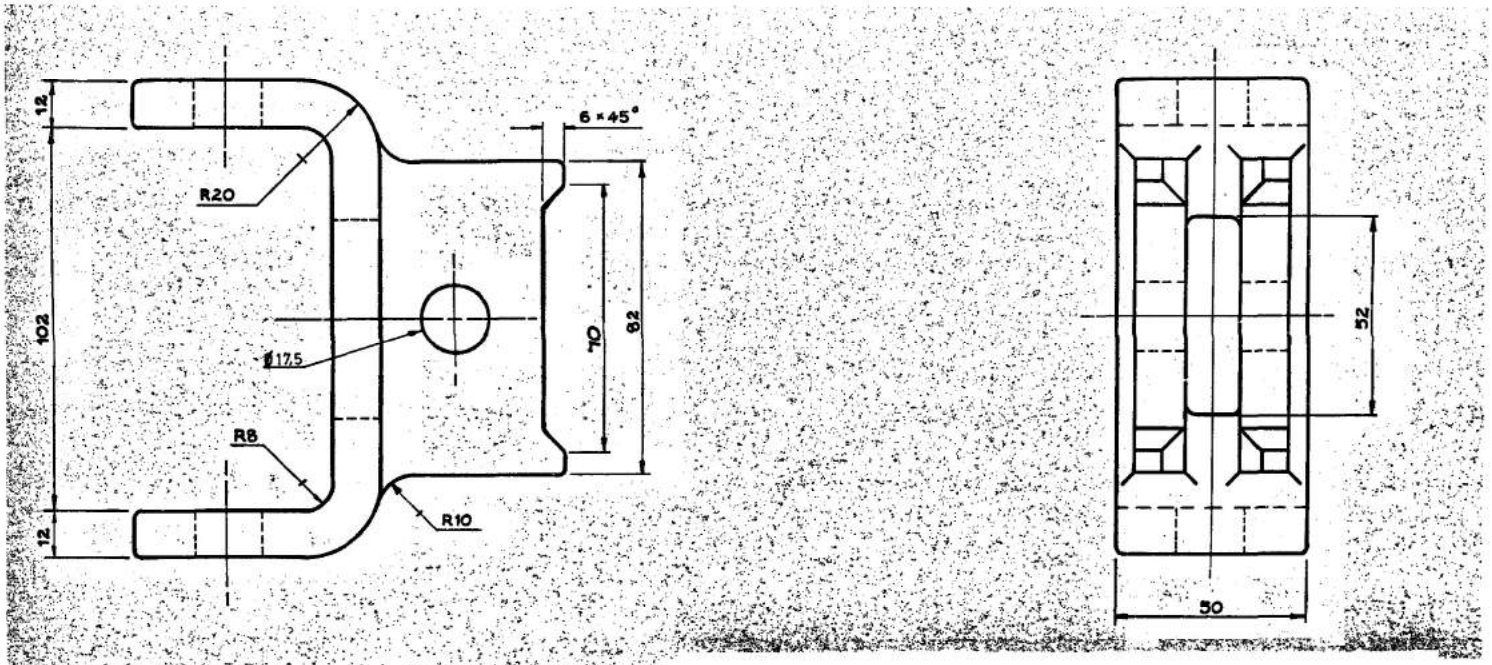
Date

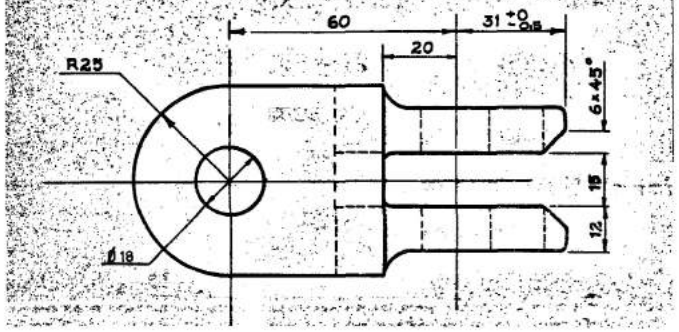
……

ANNEXURE B: TECHNICAL DATA SHEET

(To be completed by the tenderers and submitted as part of their tender)

Item	Clamp/Fitting/component tender for: (Full description)	Is all technical data sheets attached, as required in this specification? (Yes/No)





NOTES / OPMERKING

1 UNSPECIFIED RADII TO BE R2
STRALE SONDER AFMETINGS

2 THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
a) SPOORNET b) MAKER'S IDENTIFICATION c) BATCH NUMBER
DIE VOLGENDE PERMANENTE MERKE MOET OP DIE ARTIKEL VERSKYN:
a) SPOORNET b) VERVAARDIGER SE KENTEKEN c) LOTNOMMER

3 FINISH: ZINC COAT TO SPEC SABS 763
AFWERKING: SINKBEDEK VOLG SPES

(mm) 0 50 100

DIMENSIONS: MILLIMETRES
AFMETINGS : MILLIMETER

AMENDMENTS WYSIGINGS		
NO	NAME NAAM	DATE DATUM
6		91-06-11

MATERIAL & NOTE 2 REVISED
MATERIAAL & OPM 2 HERSIEN
DO REF TK-VERW T90/040

ELECTRIFICATION TYPES REFERENCE DRG NO CEE-MA-26 SH 7B
ELEKTRIFIKASIETIPES VERWYSINGSTEK-NO CEE-MA-369 VEL 7B

DO REF TK-VERW T80/65	GEN TOLERANCES: LIN ± 1.0 ALG TOLERANSIES: ANG/HOEK ± 1°	
DRN GET P MARTIN	ENG IR	DATE DATUM 80-02-11

MATERIAL/MATERIAAL
SPHEROIDAL GRAPHITE IRON
SFEROÏDAALGRAFIET-YSTER
TO SPEC SABS 936 GRADE SG 50
VOLG SPES GRAAD

GA WILLIAMS for n.
CHIEF ENGINEER (POWER SUPPLIES) INFRASTRUCTURE
HOOFINGENIEUR (KRAGVOORSIENING) INFRASTRUKTUUR

SPOORNET

ELECTRIFICATION TYPES / ELEKTRIFIKASIETIPES D,E,F,G & H:

PIVOT FITTING: MAST ATTACHMENT

DOUBLE BOOM

SPILHEGSTUK: MASHEGSTUK

DUBBELBALK

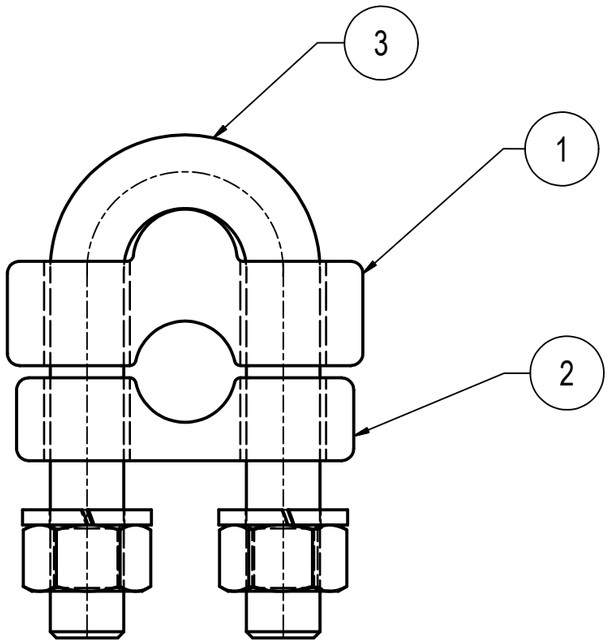
STORES ITEM NO
MAGASYNITEM-
54/11339

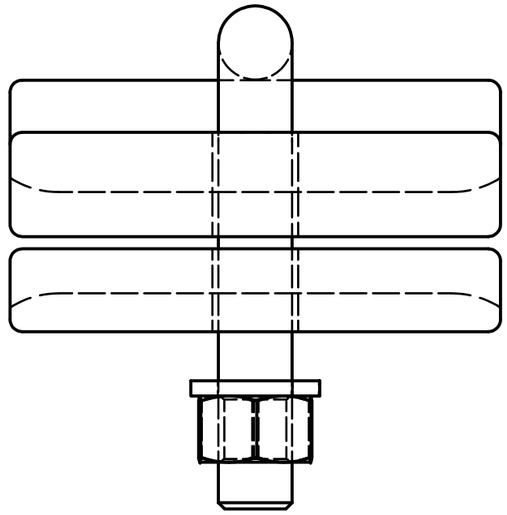
DRAWING NO CEE-TN-177
TEKENING NO

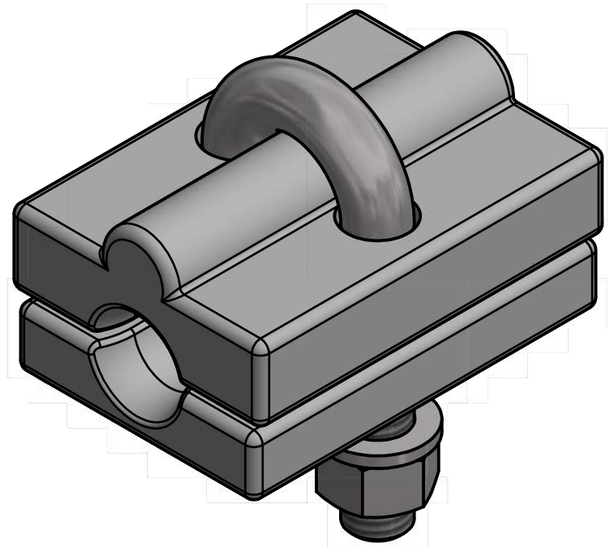
SHEET _ OF _
VEL VAN

A2

TABLE	
STORES ITEM NO.	WIRE SIZE mm²
54002033	50mm² Al 52mm² ACSR - RABBIT
54015147	100mm² ACSR - SKUNK
54010496	161mm² ACSR - TIGER







NOTES
1. USE BRIGHT STEEL DISTANCE PIECES WHEN CHECKING HOLE SIZE.
2. THE FOLLOWING PERMAMENT MARKINGS MUST APPEAR ON THIS ARTICLE:
 (a) TRANSNET LOGO.
 (b) MANUFACTURER'S IDENTIFICATION.
 (c) DATED BATCH NUMBER.
 (d) WIRE SIZE.

ITEM	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
3	U-BOLT	1	-	BBH1233 SHT 2 ITEM 6
2	ALUMINIUM CLAMP	1	-	CEE-TN-0371 SHT 1
1	ALUMINIUM CLAMP	1	-	CEE-TN-0371 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN ± 1 ANG ± - ITEM NO : -
MATERIAL : -

VERSION INFO : REVISED AND REDRAWN

29/07/2020
APPROVED : W SCHOEMAN

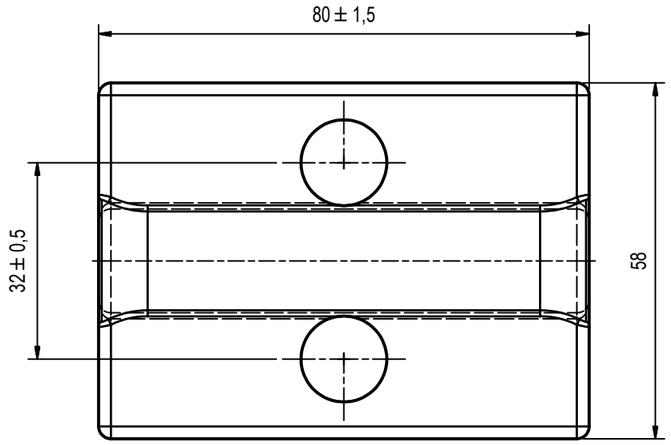
29/07/2020
AUTHORISED : S SMIT

EARTH WIRE CLAMP ASSEMBLY 50/9mm², 50mm², 100mm² OR 160mm²

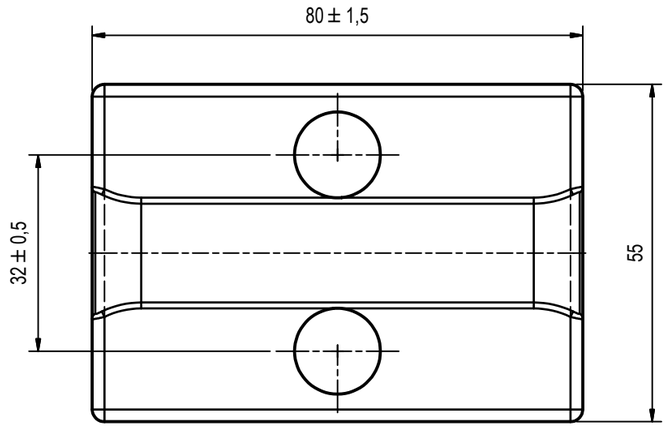
TRANSNET freight rail

CEE-TN-0371
VERSION 5 A3

DO REF : CDO/9424 ECP REF : - DRAWN : D HATTINGH DESIGNED : - CHECKED : D HATTINGH



ITEM 1



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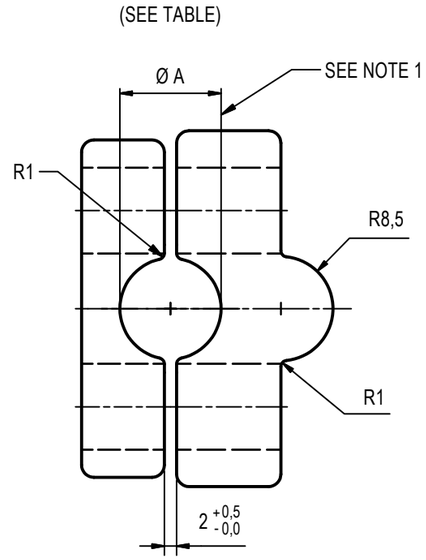
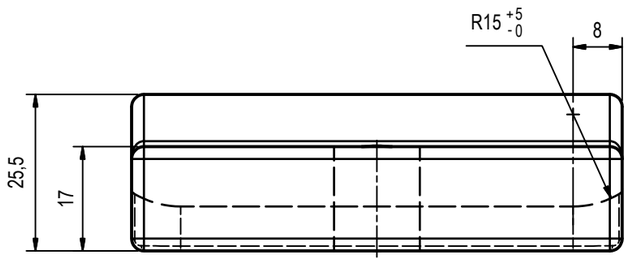




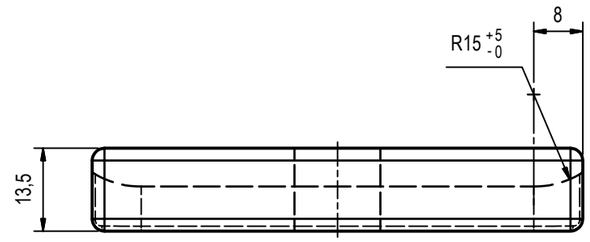
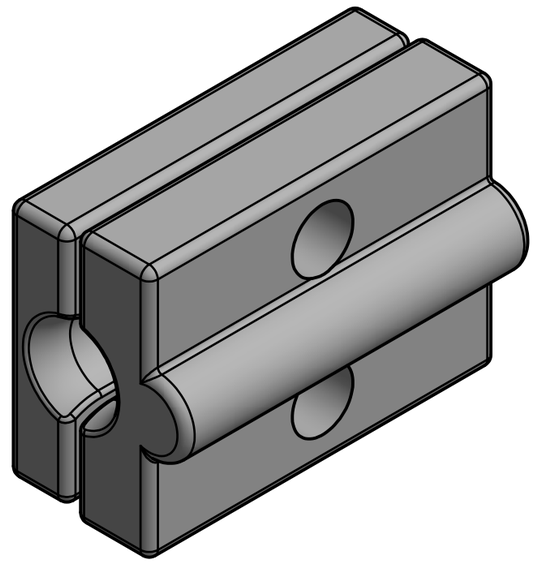


TABLE	
DIAMETER A (mm)	WIRE SIZE (mm²)
10 +0,5 -0,0	50 Al 52mm² ACSR - RABBIT
12 +0,5 -0,0	100mm² ACSR - SKUNK
16,5 +0,5 -0,0	161mm² ACSR - TIGER



DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN ± 1 ANG ± -
MATERIAL : ALUMINIUM GRADE 6063 OF BS EN 573-3

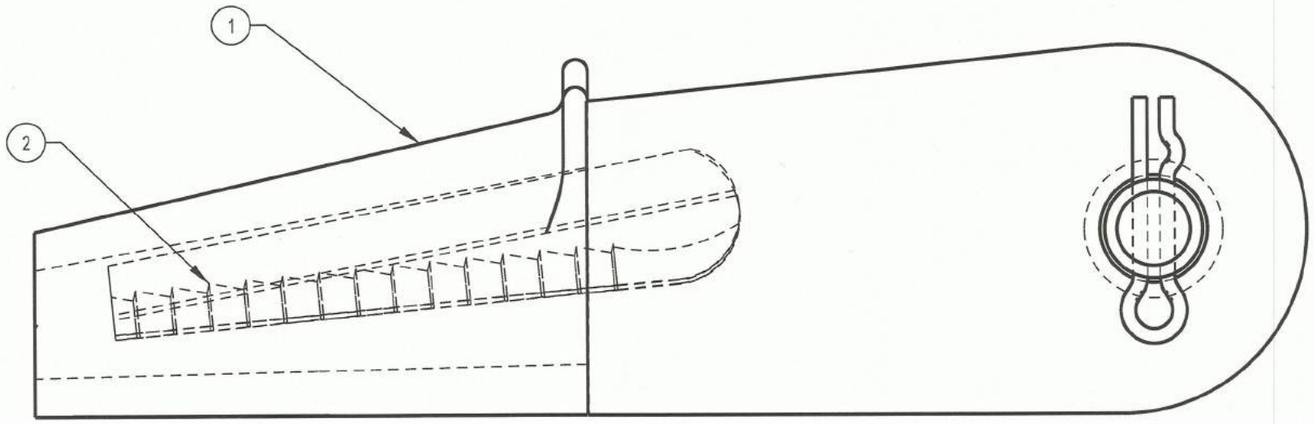
DRAWN : D HATTINGH CHECKED : D HATTINGH

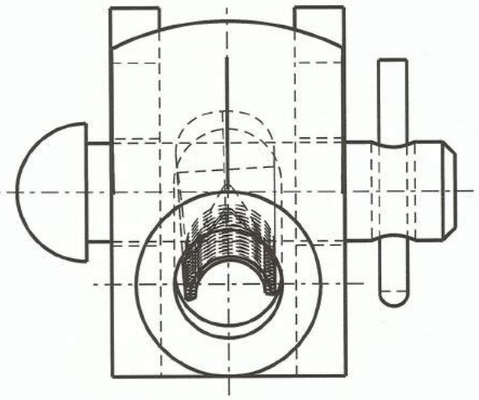
EARTH WIRE CLAMP

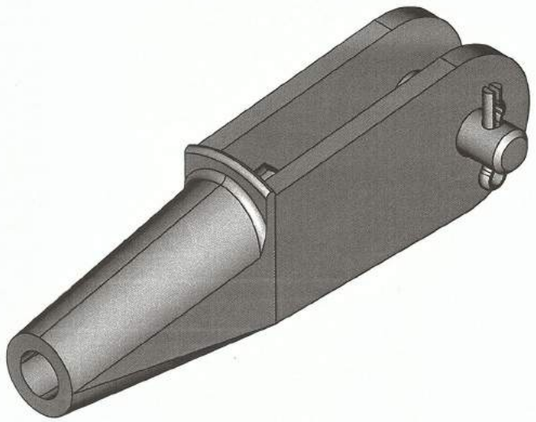
TRANSNET freight rail

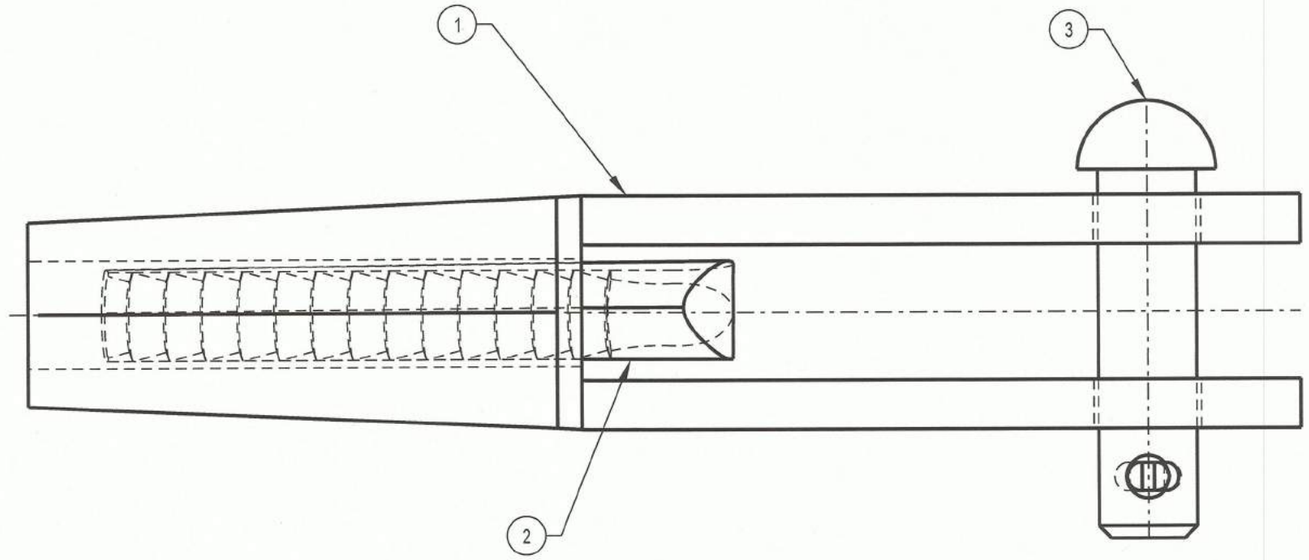
CEE-TN-0371 SHT 1

VERSION 5 A3









NOTES
1. MINIMUM ULTIMATE TENSILE = 90kN
2. TEST SAMPLES OF EACH BATCH SHALL BE ROUTINE TESTED IN TENSION WITH A STEEL BAR TO 63kN

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
3	CLEVIS PIN, Ø16 x 60 LONG COMPLETE WITH LOCKING SPLIT PIN	1	54004020	CEE-TX-0066
2	CONE BODY	1	-	CEE-TNB-0036 Sht 2
1	WEDGE	1	-	CEE-TNB-0036 Sht 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± - ANG± - ITEM NO : 54004978
MATERIAL : -
VERSION INFO : REDRAW AND UPDATE

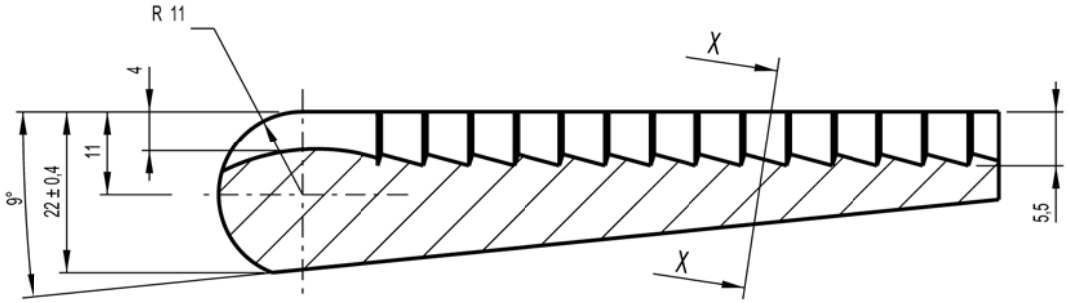
+ 2019-08-16
APPROVED S. SMIT

+ 2019-8-16
AUTHORISED L. BORCHARD

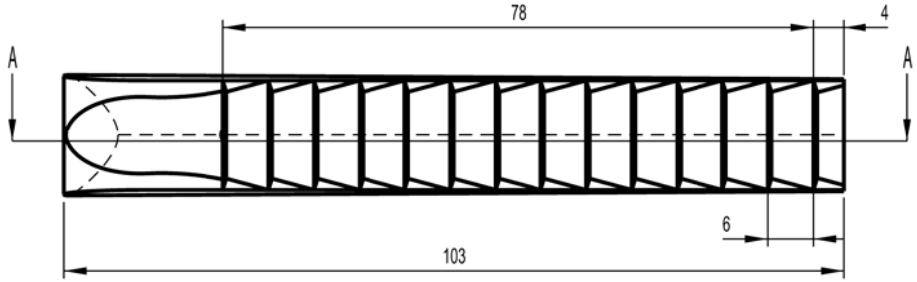
WIRE ENDING CONE ASSEMBLY
107mm² / 161mm² Cu CONTACT WIRE

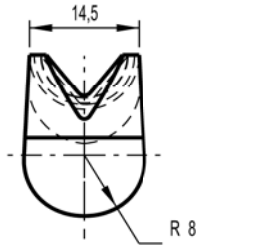
TRANSNET freight rail
CEE-TNB-0036
VERSION 2
A3

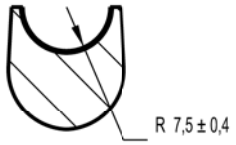
DO REF: CDO/9132 ECP REF: - DRAWN: MP SAKO DESIGNED: - CHECKED: D HATTINGH



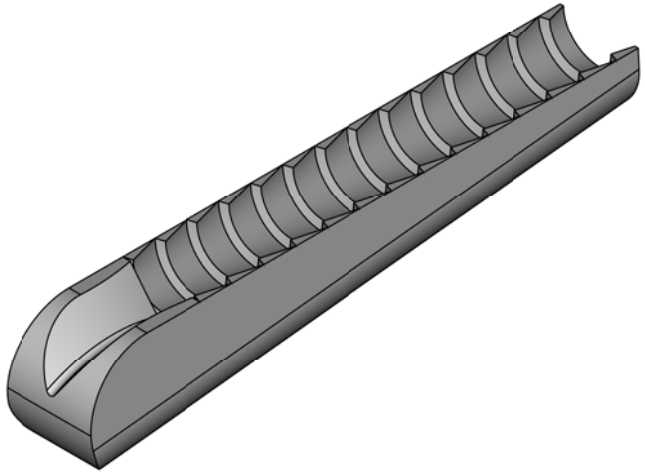
SECTION A - A







SECTION X - X



NOTES.

1. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
2. FINISH: HOT DIP GALVANISED TO SANS 121

DIMENSIONS : mm	SCALE : 1 : 1
TOLERANCE : LIN± 1	ANG± 0,5°
MATERIAL : SPHEROIDAL GRAPHITE IRON TO SANS 936 GRADE SG 50	
DRAWN : MP SAKO	CHECKED : D HATTINGH

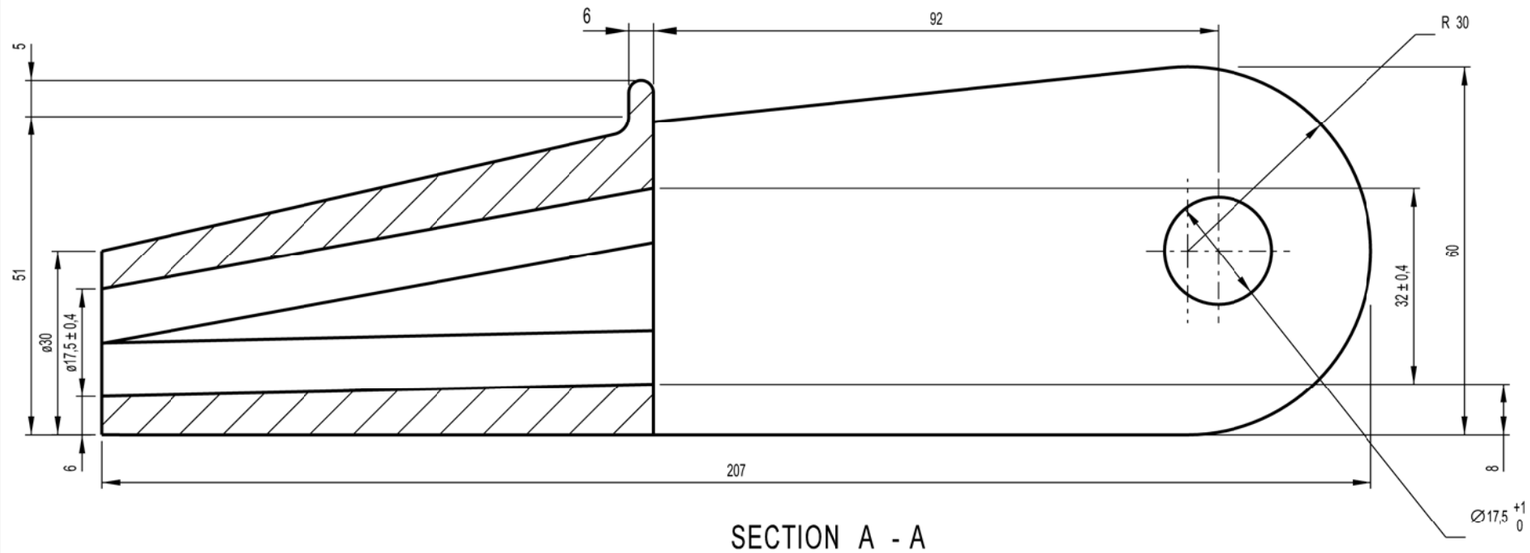
WEDGE
107mm² / 161mm² Cu CONTACT WIRE ENDING CONE

TRANSNET freight rail

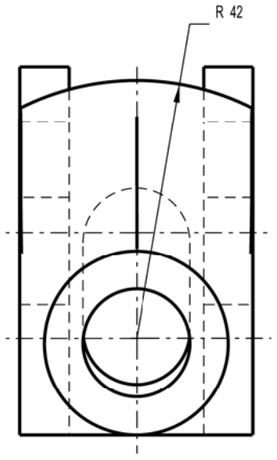
CEE-TNB-0036 Sht 1

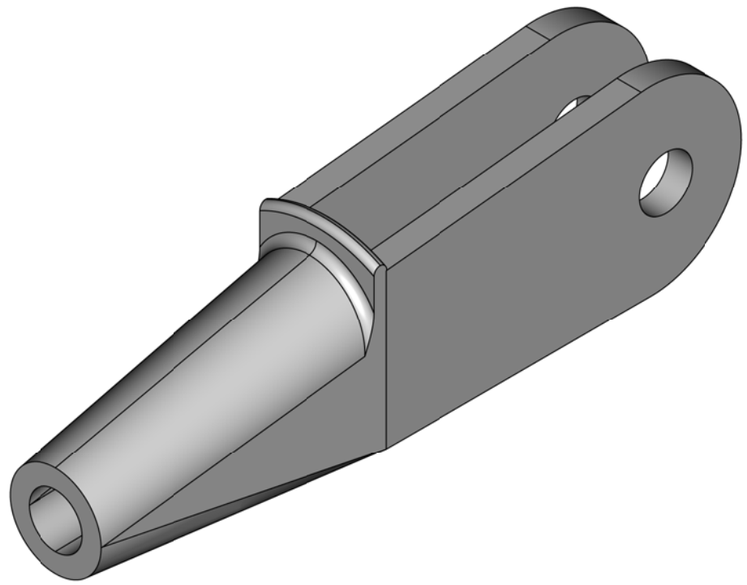
VERSION 2

A4



SECTION A - A





FINISH
HOT DIP GALVANISED TO SANS 121.
REMOVE ALL SHARP EDGES BEFORE GALVANISING

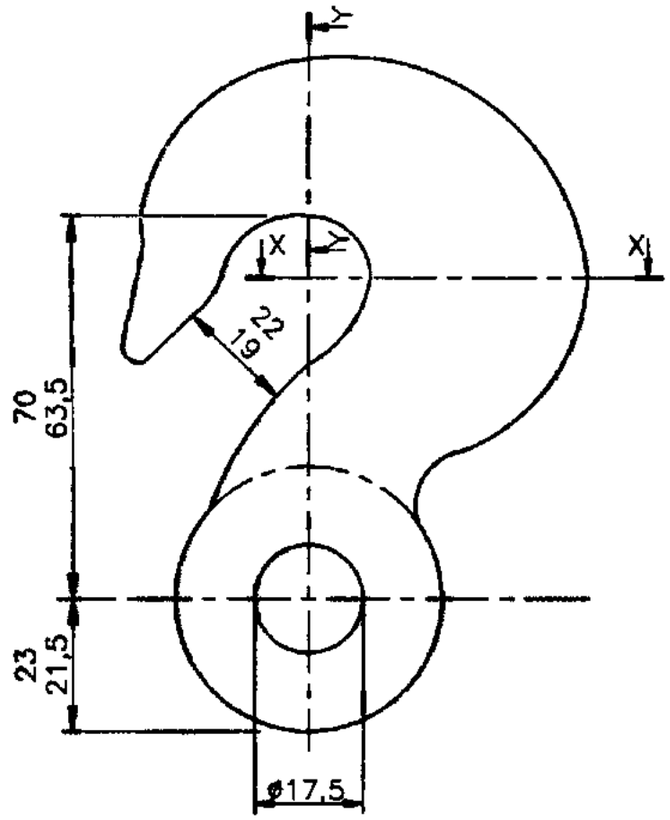
NOTES
THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
a) TRANSNET LOGO
b) MAKER'S IDENTIFICATION
c) DATED BATCH NUMBER

DIMENSIONS	: mm SCALE : 1 : 1
TOLERANCE	: LIN± 1 ANG± -
MATERIAL	: SPHEROIDAL GRAPHITE IRON TO SANS 936 GRADE SG 50
DRAWN	: MP SAKO CHECKED : D HATTINGH

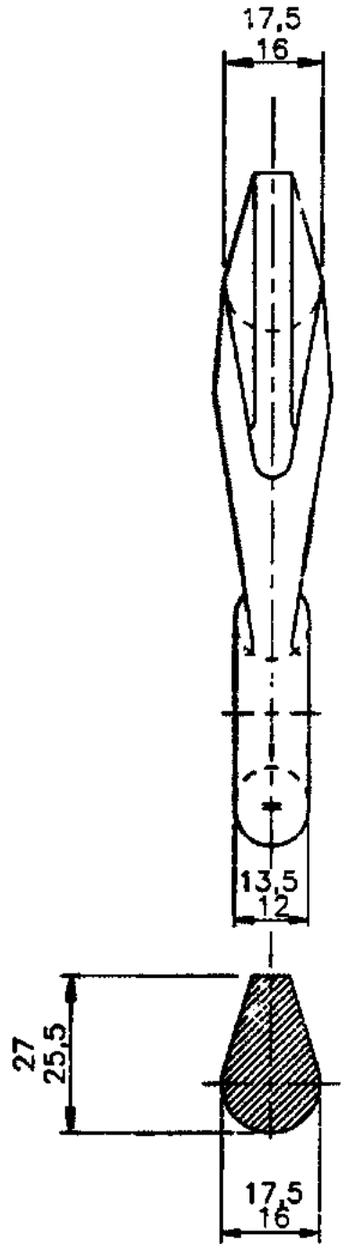
CONE BODY
107mm²/ 161mm² Cu CONTACT WIRE ENDING CONE

TRANSNET freight rail

CEE-TNB-0036 Sht 2
VERSION 2 A3



SECTION X–X



SECTION Y–Y

NOTES
1. MECHANICAL STRENGTH 44.5kN.

2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) SPOORNET
   b) MAKER'S IDENTIFICATION
   c) BATCH NUMBER.

3. ZINC COAT TO SPEC SABS 763 FOR CONDITIONS IN SITU.

AMENDMENTS		
NO	NAME	DATE
1	JVT	95–09–11

REVISED, DRG NO WAS CEE–TN–361.
DO REF: T95/051

STORES ITEM NO

DIMENSION: mm
SCALE: 1:1

MATERIAL: ITEM NO ——— SPHEROIDAL GRAPHITE IRON TO SPEC SABS 936 GRADE SG 50

DO REF: J71/228	GEN TOL: LIN± 0.5 ANG± 1°	
DRN: C. S.	CKD: ———	DATE: 62–06–13
ENG: ———	W PHILLIPS for CHIEF ENG	

INFRASTRUCTURE (ELECTRICAL)

SPOORNET

TOWER HOOK

A3

DRAWING NO CEE–TNB–41

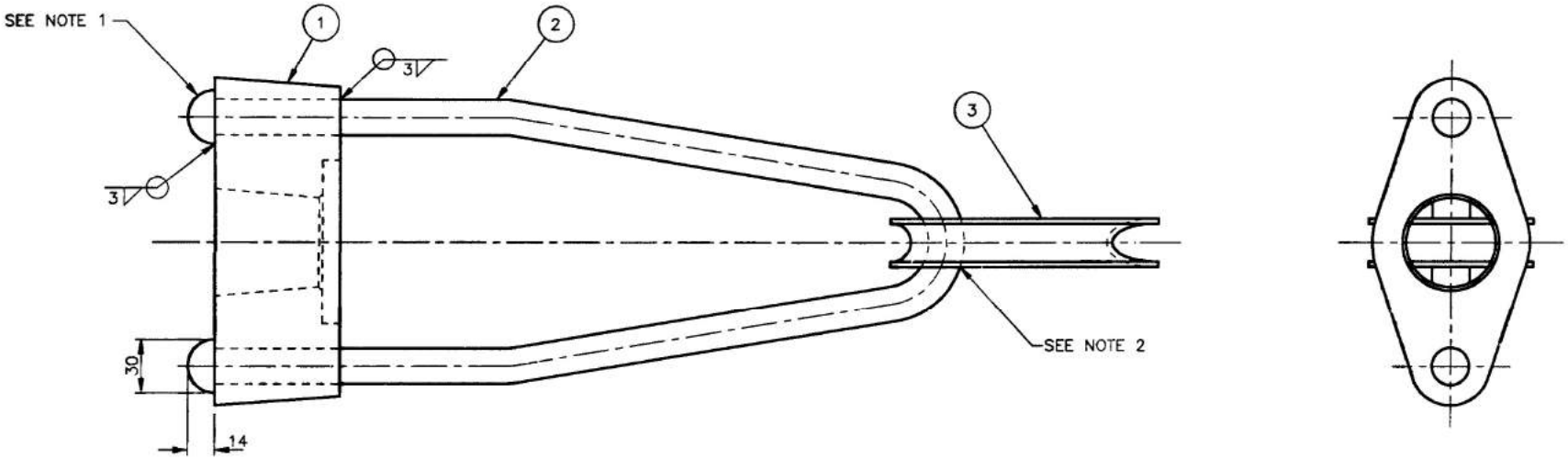
SHEET – OF –

10000071

ITEM	DESCRIPTION	QTY	STORES ITEM NO	DRG NO CEE–
1	CROSSHEAD	1	———	TNB–48
2	BOW	1	———	TNB–47
3	ROPE THIMBLE	1	———	TNB–39

AMENDMENTS		
NO	NAME	DATE
1	JP du P	96–02–07

REVISED, DRG NO WAS CEE–TN–269.
DO REF: T96/003



NOTES
1. FORM RIVET HEADS "HOT".
2. INSERT ITEM 2 THROUGH ITEM 3 BEFORE ASSEMBLY.
3. STRENGTH: MINIMUM ULTIMATE TENSILE STRENGTH 222kN.
4. ZINC COAT TO SABS 763 (TABLE 2) AFTER WELDING.

STORES ITEM NO
54/2437

DIMENSIONS: mm
SCALE: 1:2

A2

DO REF: C221/73	GEN TOL: LIN± 1 ANG± –	
DRN: E G LOUW	CKD: J JACKSON	DATE: 74–02–06
ENG: ———	F PIENAAR	for CHIEF ENG

INFRASTRUCTURE (ELECTRICAL)

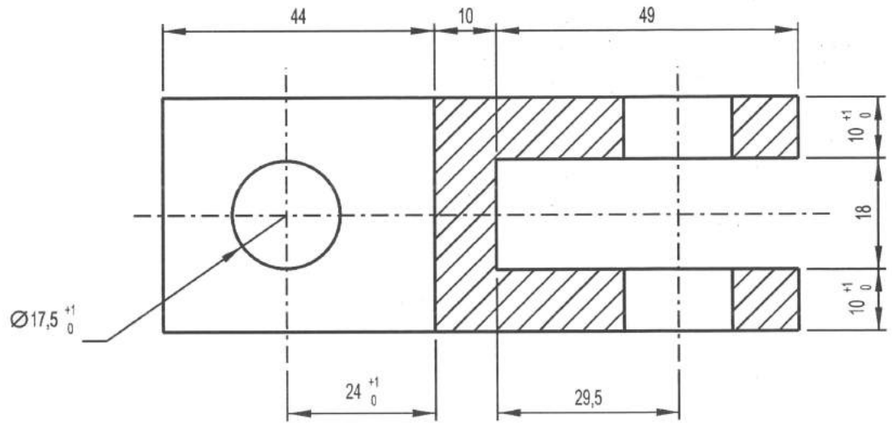
SPOORNET

BOW AND CROSSHEAD ASSEMBLY
STAY WIRE ARRANGEMENT

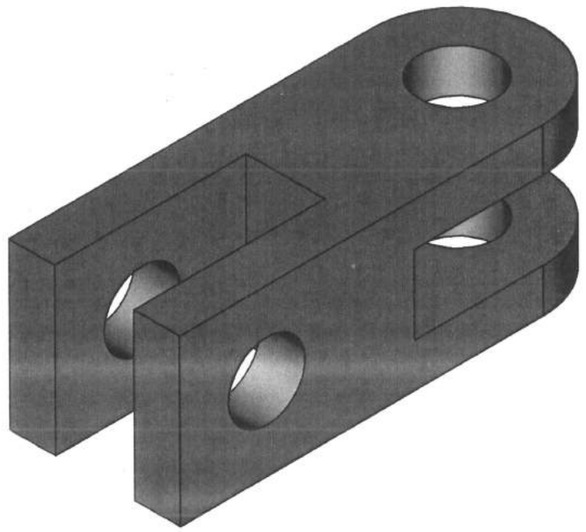
DRAWING NO CEE–TNB–50

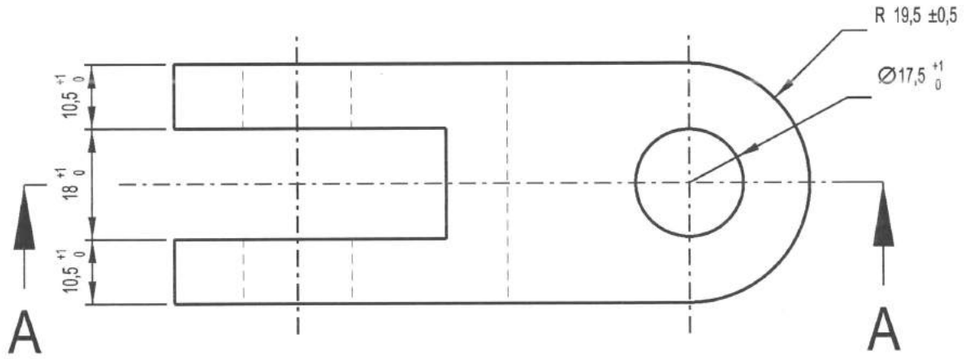
SHEET — OF —

T0000139



SECTION A-A



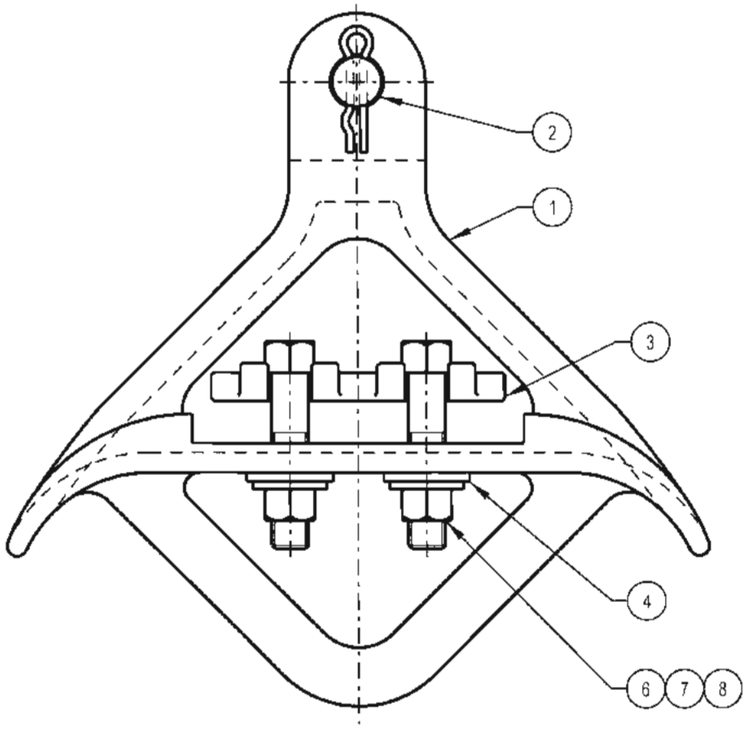


NOTES:
1. MECHANICAL STRENGTH REQUIREMENT: ULTIMATE TENSILE LOAD 70kN.
2. OTHER SUITABLE MATERIAL MAY BE OFFERED BY TENDER FOR CONSIDERATION. THIS ITEM IS USED ON OVERHEAD TRACK EQUIPMENT AND MUST BE CORROSIVE RESISTANT.
3. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   (a) TRANSNET LOGO.
   (b) ORIGINAL EQUIPMENT MANUFACTURERS IDENTIFICATION.
   (c) DATED BATCH NUMBER.
4. FINISH: HOT DIP GALVANISE TO SANS 121.

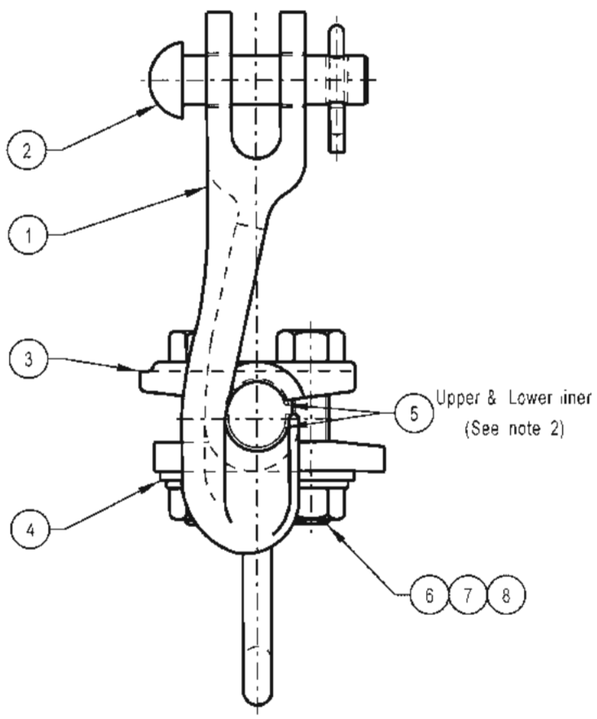
DIMENSIONS : mm TOLERANCE : LIN± 1 ANG± - MATERIAL : SPHEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50 VERSION INFO : CLEVIS CHANGED TO 18mm.	SCALE : 1 : 1 ITEM NO : 54001521	+ 04-12-2019 APPROVED: S SMIT	+ 2019-12-4 AUTHORISED: LO BORCHARD	CLEVIS FITTING TWISTED "H"

TRANSNET freight rail
CEE-TNB-0060
VERSION 3
A3

DO REF: CDO/ 9490 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: -



ITEM 5 NOT SHOWN IN THIS VIEW
(SEE NOTE 2)



NOTES

1. Mechanical strength with vertical load 44,5kN, Slipping load 13,3kN
2. Use Item 5 when this clamp is used for the 162mm² ACSR (Tiger) Catenary.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
8	Hexagon nut, Mild steel, Galvanised, M12	4	-	-
7	Spring lock washer, Single coil, Sq. section, Galvanised, M12	4	-	-
6	Hexagon Bolt, Grade 8,8, Galvanised, M12 x 65 long	4	-	-
5	Upper and Lower liner, 162mm² ACSR Catenary wire (See Note 2)	1	-	CEE TNB-0089
4	Strap	2	54301081	CEE TNB-0072 Sht. 4
3	Saddle	1	5430108C	CEE TNB-0072 Sht. 3
2	Clevis pin, Ø16 x 60 long complete with locking pin	1	54004020	CEE TX-0066
1	Clamp body clevis type with tie down facility	1	-	CEE TNB-0073 Sht. 2

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN± - ANG± - ITEM NO : -
MATERIAL : -
VERSION INFO : Updated and placed on Transnet frame

+30/07/2018
APPROVED

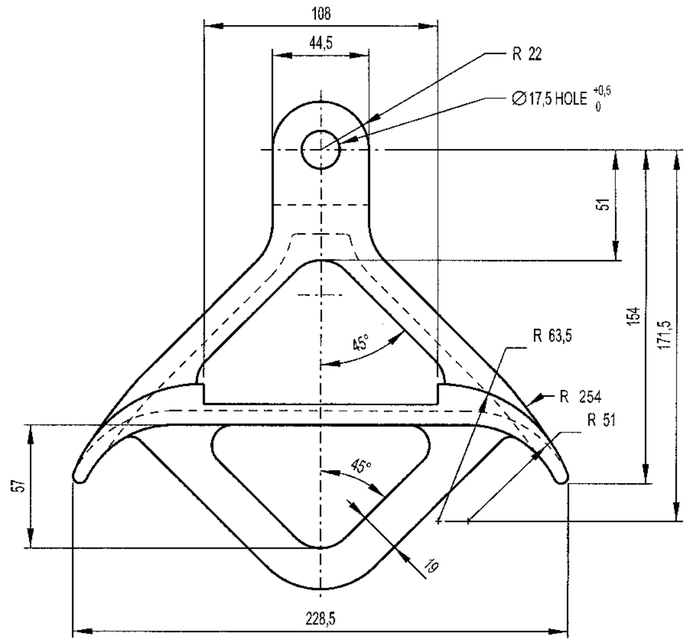
+2018-7-30
AUTHORISED

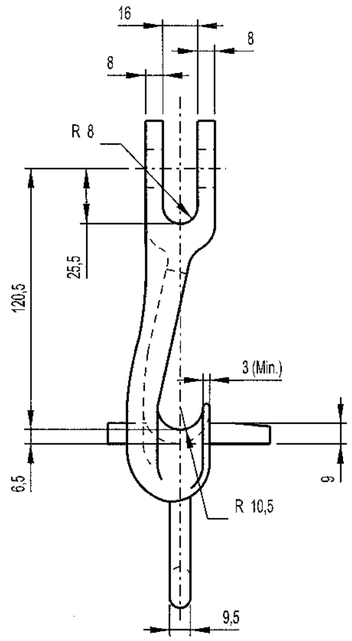
SINGLE SUSPENSION CLAMP
CLEVIS TYPE WITH TIE DOWN FACILITY

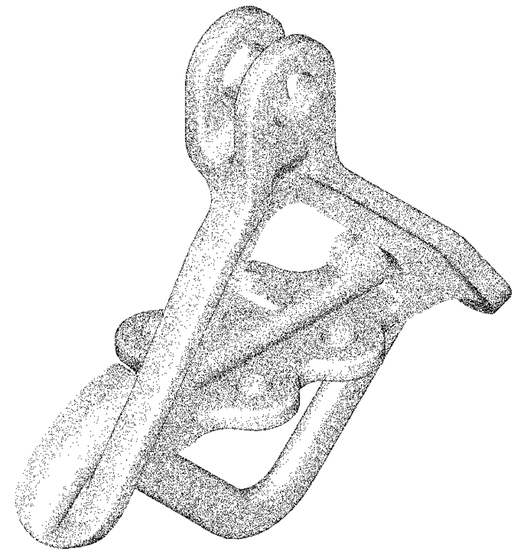
TRANSNET
freight rail

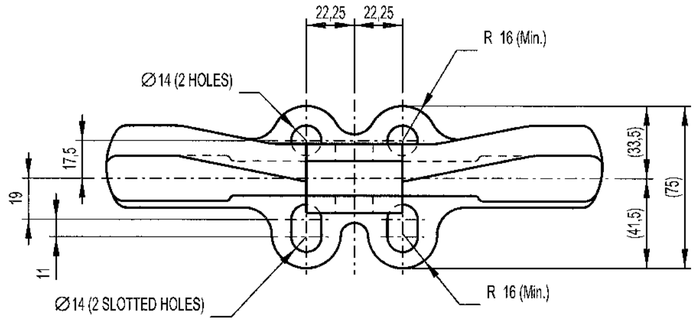
CEE TNB-0073 Sht. 1
VERSION 3 A3

DO REF: CDO/9095 ECP REF: - DRAWN: D.A Ballabio DESIGNED - CHECKED -



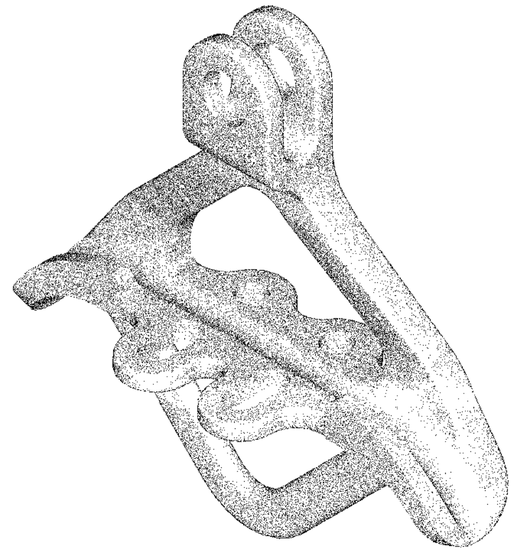




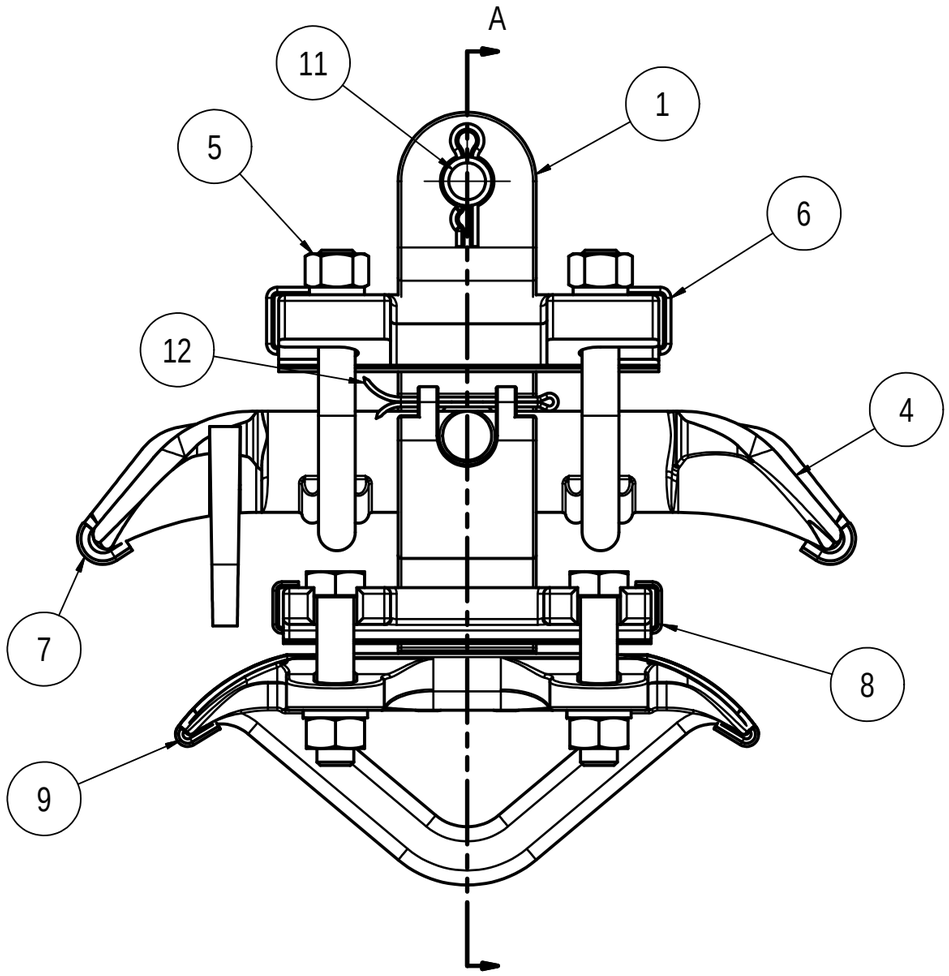


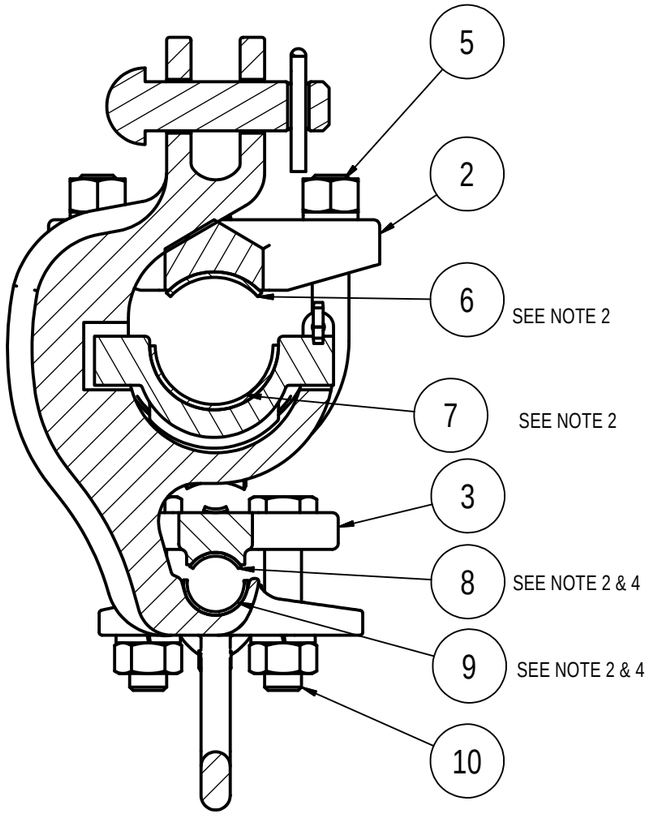
NOTES

1. ALL UNSPECIFIED RADII TO BE R2.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a). TRANSNET LOGO.
   b). MANUFACTURERS IDENTIFICATION.
   c). DATED BATCH NUMBER.
   d). CONDUCTOR SIZE.
3. ITEM TO BE SUPPLIED WITH AN ALUMINIUM LINER.
4. FINISH: HOT DIP GALVANISED TO SANS 121.
5. MAX. VERTICAL LOADING = 44.5kN

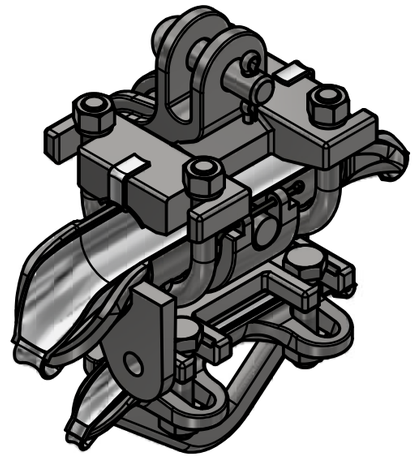


DIMENSIONS : mm	SCALE : 1 : 2	DO REF : CDO/ 9424	2019-09-18	SINGLE SUSPENSION CLAMP BODY CLEVIS TYPE WITH TIE DOWN FACILITY	TRANSNET freight rail
TOLERANCE : LIN ± 0,5 ANG ± 1°	ITEM NO : -	ECP REF : -	APPROVED: S SMIT		CEE TNB-0073 Sht. 2
MATERIAL : SPHEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50		DRAWN : D HATTINGH	2019-09-18		VERSION 3
VERSION INFO : NOTE ADDED.		DESIGNED : -	AUTHORISED: L O BORCHARD		A2
		CHECKED : -			





SECTION A-A



STRENGTH :	MIN. ULTIMATE WITH VERTICAL LOAD	: 44,5kN		
	MIN. ULTIMATE WITH SLIPPING LOAD	: 13,3kN		
WORKING LOAD:	MIN. IN UPPER CRADLE (ITEM 4)	: 4,4kN		
	MIN. IN LOWER CRADLE (ITEM 1)	: 8,9kN		
	MIN. OF COMPLETE CRADLE	: 13,3kN		

NOTES
1. THE FOLLOWING PERMAMENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   (a) TRANSNET LOGO.
   (b) MANUFACTURER'S IDENTIFICATION.
   (c) DATED BATCH NUMBER.
2. BEFORE ASSEMBLY: APPLY OXIDATION INHIBITING JOINTING COMPOUND BETWEEN ITEMS 2 AND 6, ITEM 4 AND 7, ITEM 3 AND 8, ITEM 1 AND 9.
3. ITEM 8 AND 9 TO BE USED WITH 162mm² ACSR (TIGER) CATENARY.
4. CRITICAL DIMENSIONS ARE PROVIDED - MANUFACTURER TO DESIGN DETAIL TO PROVIDE STRENGTH AND WORKING LOAD REQUIREMENTS

ITEM	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
12	SPLIT PIN, ISO 1234 - 3.2 x 56 St/A	1	-	-
11	CLEVIS PIN.	1	-	CEE-TX-0066
10	BOLT, NUT, LOCKING WASHER, HEX HEAD, HEX NUT, STEEL GRADE 8.8, M12 x 55L, GALVANIZED TO SANS 121.	1	-	CEE-TNB-0074 SHT 5
9	LOWER LINER FOR 162mm² ACSR (TIGER) CATENARY WIRE.	1		CEE-TNB-0074 SHT 6
8	UPPER LINER FOR 162mm² ACSR (TIGER) CATENARY WIRE.	1	-	CEE-TNB-0074 SHT 6
7	LOWER LINER FOR FEEDER WIRE.	1		CEE- TNB-0074 SHT 6
6	UPPER LINERS FOR FEEDER WIRE.	1	-	CEE-TNB-0074 SHT 6
5	U-BOLT.	1	-	CEE-TNB-0074 SHT 5
4	CRADLE FOR FEEDER WIRE.	1	-	CEE-TNB-0074 SHT 4
3	CLAMP FOR CATENARY WIRE.	1	-	CEE-TNB-0074 SHT 3
2	CLAMP FOR FEEDER WIRE.	1	-	CEE-TNB-0074 SHT 2
1	DOUBLE SUSPENSION CLAMP BODY.	1	-	CEE-TNB-0074 SHT 1

DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN ± 1 ANG ± 1° ITEM NO : -
MATERIAL : -

VERSION INFO : REVISED AND REDRAWN

02/07/2021
APPROVED : W SCHOEMAN

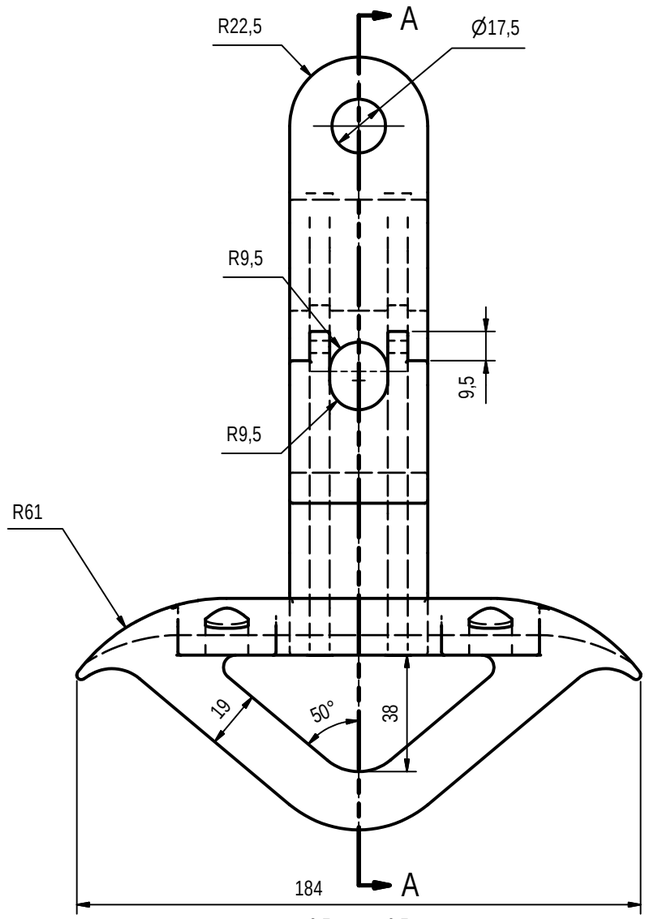
02/07/2021
AUTHORISED : S SMIT

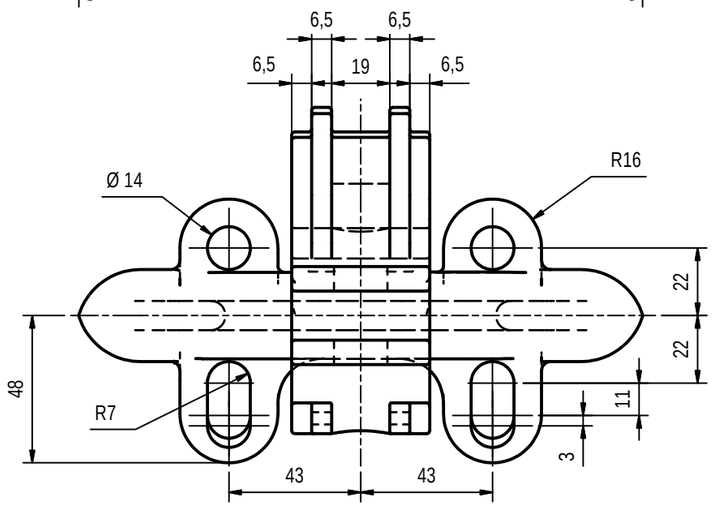
DOUBLE SUSPENSION CLAMP
80mm² - 250mm² CATENARY WIRES, 500mm² - 800mm² FEEDER WIRES

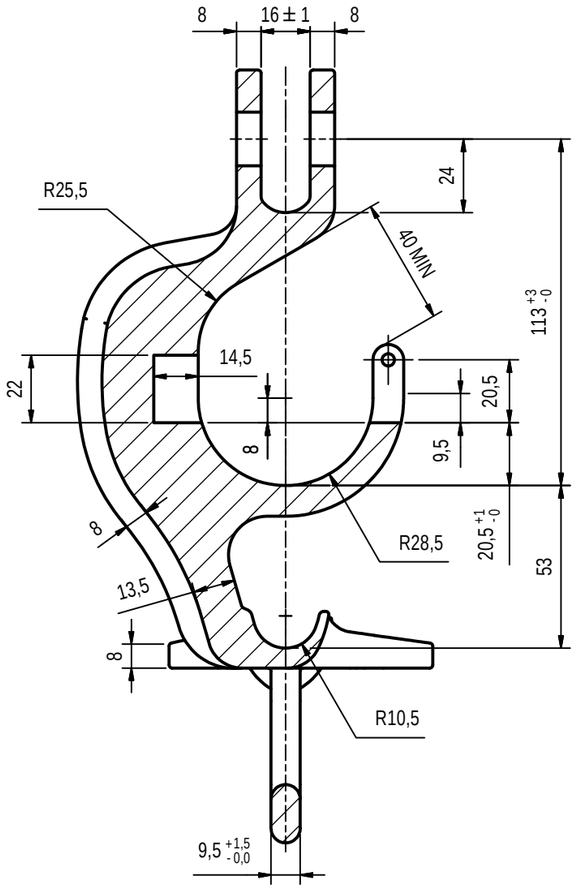
TRANSNET freight rail

CEE-TNB-0074
VERSION 2 A3

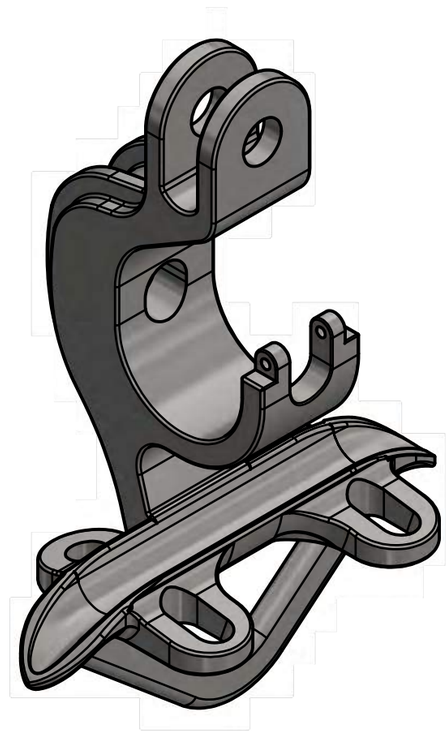
DO REF : CDO/9424 ECP REF : - DRAWN : D HATTINGH DESIGNED : - CHECKED : D HATTINGH







SECTION A - A



NOTES
1. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   (a) TRANSNET LOGO.
   (b) MANUFACTURER'S IDENTIFICATION.
   (c) DATED BATCH NUMBER.
2. HOT DIPPED GALVANIZED TO SANS 121.

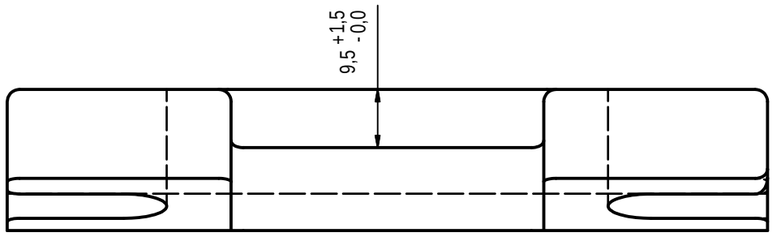
DIMENSIONS	: mm	SCALE : 1 : 2	
TOLERANCE	: LIN ± 0,5 ANG ± 0,5°		
MATERIAL	: SPEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50		
DRAWN	: D HATTINGH	CHECKED : D HATTINGH	

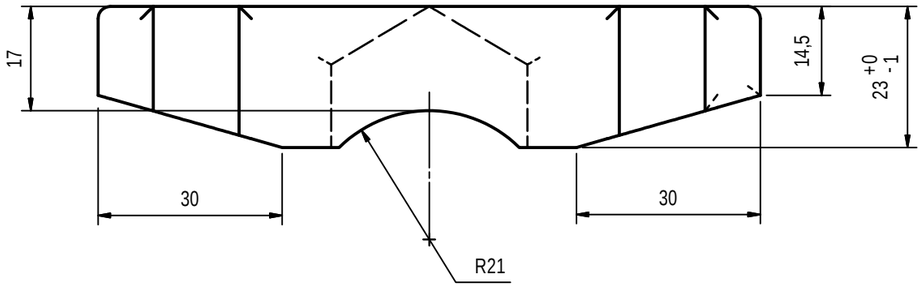
BODY, DOUBLE SUSPENSION CLAMP

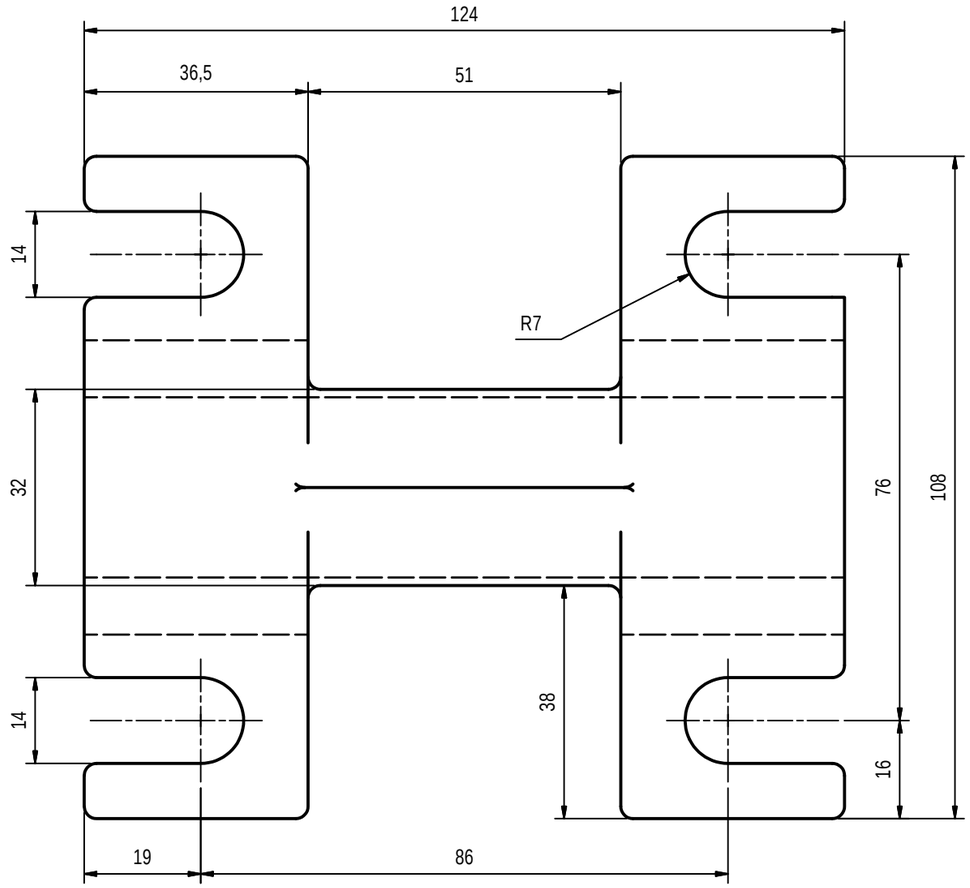
TRANSNET freight rail

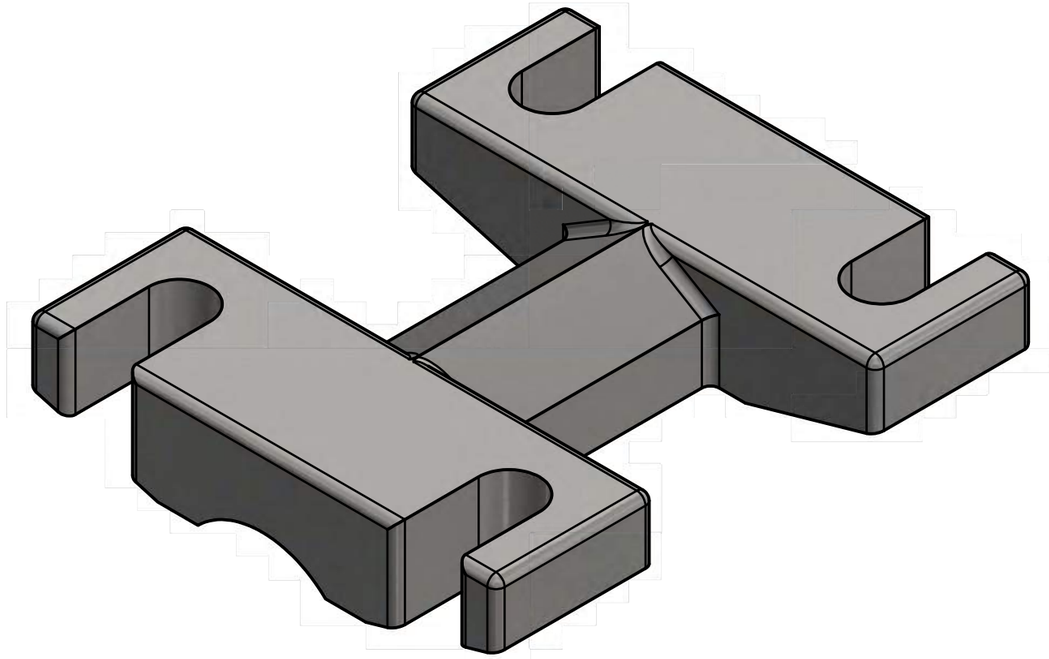
CEE-TNB-0074 SHT 1

VERSION 2 A3









NOTE
HOT DIPPED GALVANIZED TO SANS 121.

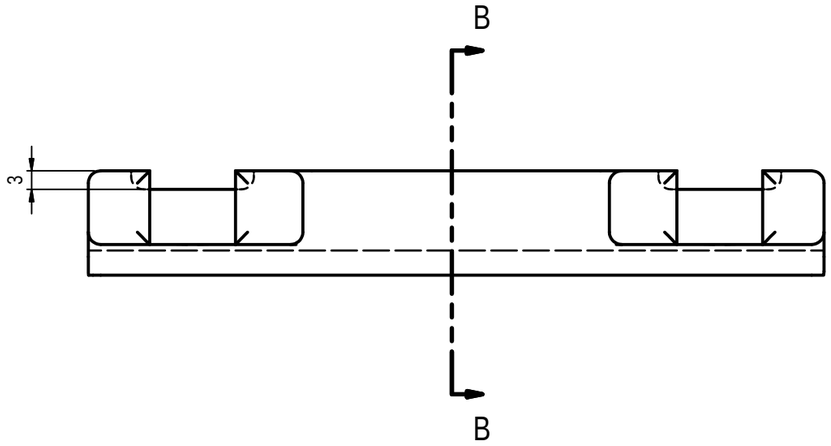
DIMENSIONS	: mm	SCALE	: 1 : 1
TOLERANCE	: LIN ± 1 ANG ± 1°		
MATERIAL	: SPEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50		
DRAWN	: D HATTINGH	CHECKED	: D HATTINGH

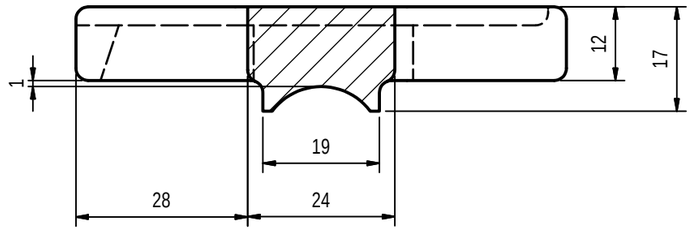
CLAMP FOR FEEDER WIRE
500mm² - 800mm²

TRANSNET freight rail

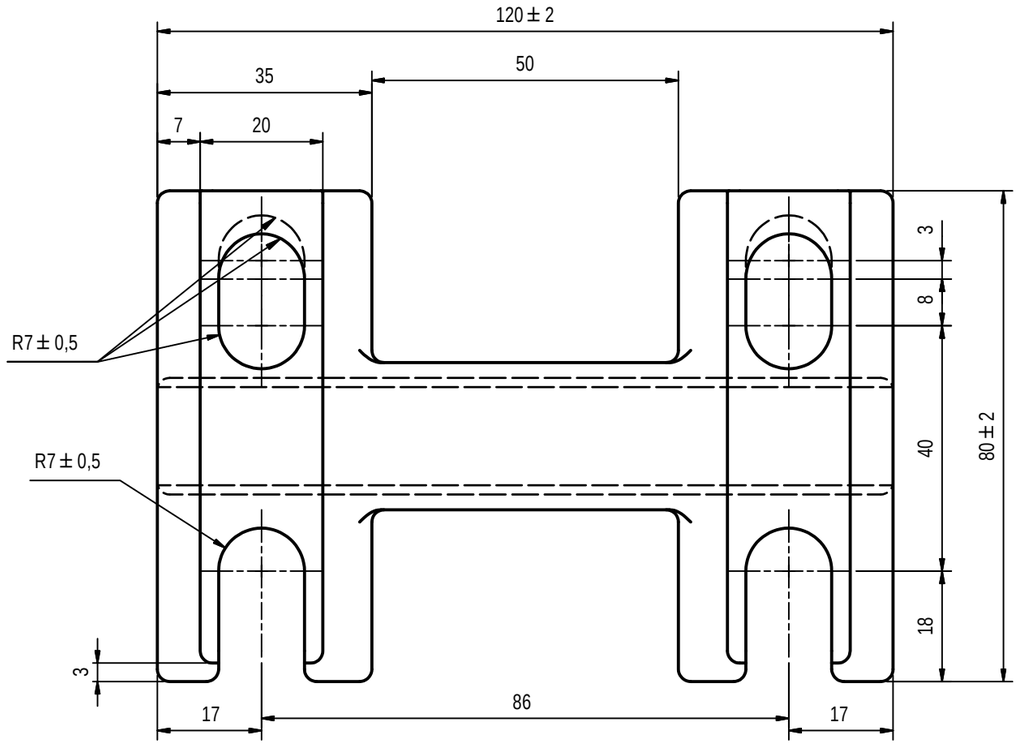
CEE-TNB-0074 SHT 2

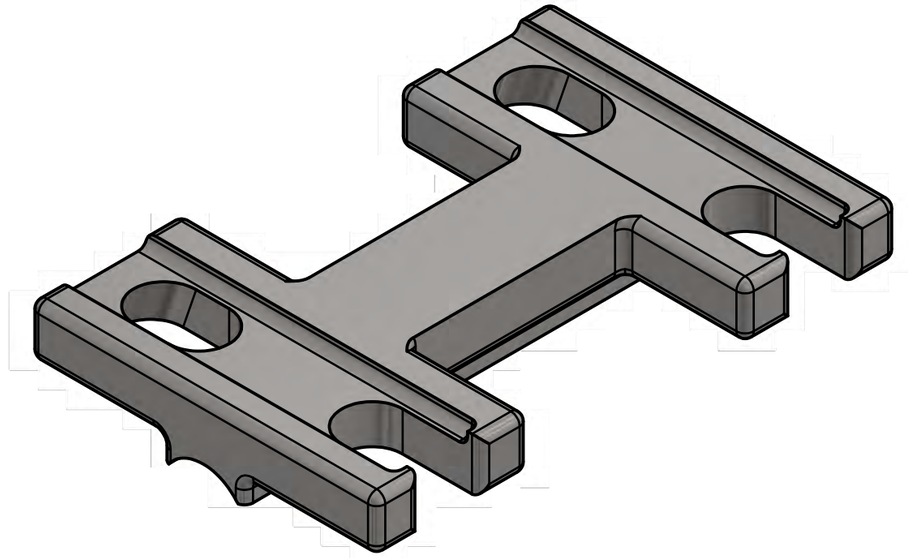
VERSION 2 A3





SECTION B-B





NOTES
1. ALL UNSPECIFIED RADIUS R2.
2. THIS ITEM TO BE HOT DIPPED GALVANIZED TO SANS 121.
3. ITEM TO SUIT 80mm² TO 250mm² WIRE SIZES.

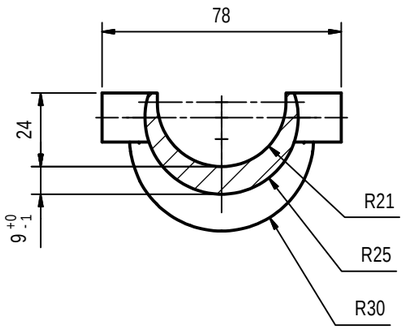
DIMENSIONS	: mm	SCALE : 1 : 1	
TOLERANCE	: LIN ± 1 ANG ± 1°		
MATERIAL	: SPEROIDAL GRAPHITE IRON TO SPEC SANS 936 GRADE SG 50		
DRAWN	: D HATTINGH	CHECKED : D HATTINGH	

CLAMP FOR CATENARY WIRE
80mm² - 250mm²

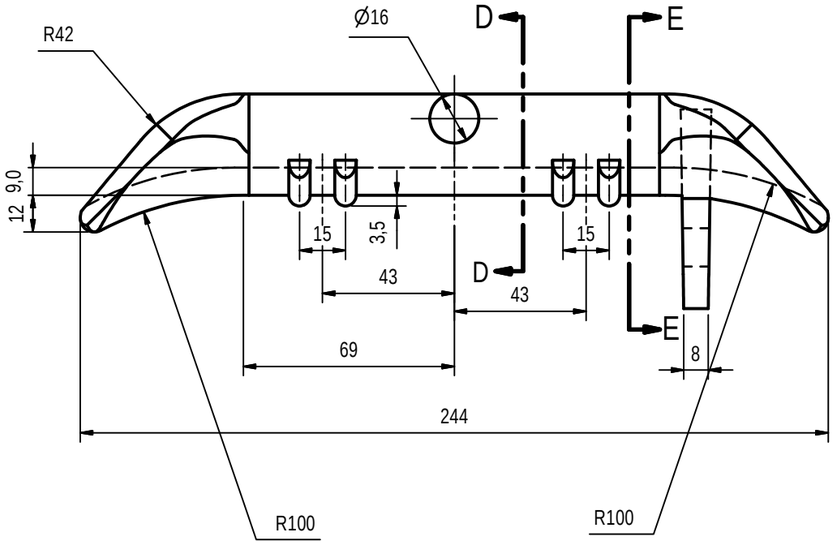
TRANSNET freight rail

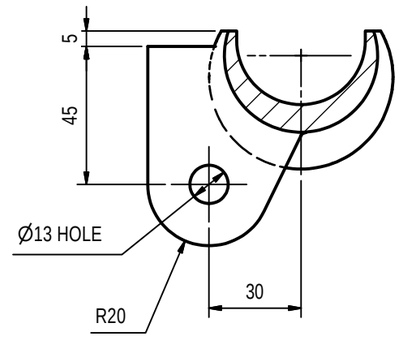
CEE-TNB-0074 SHT 3

VERSION 2 A3

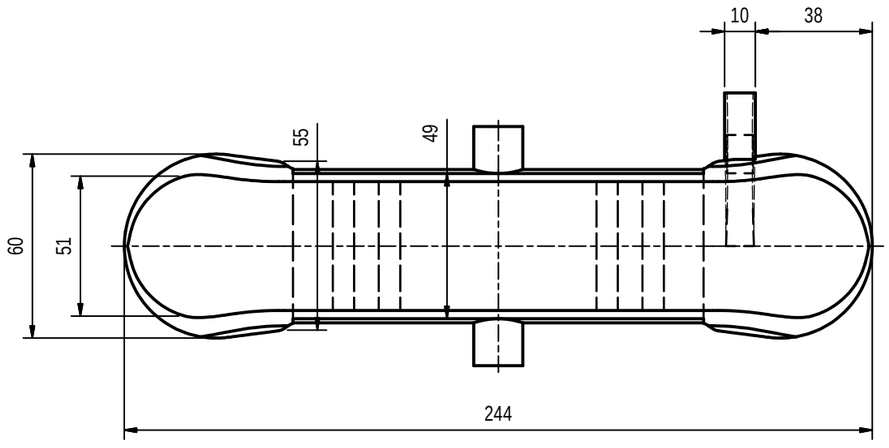


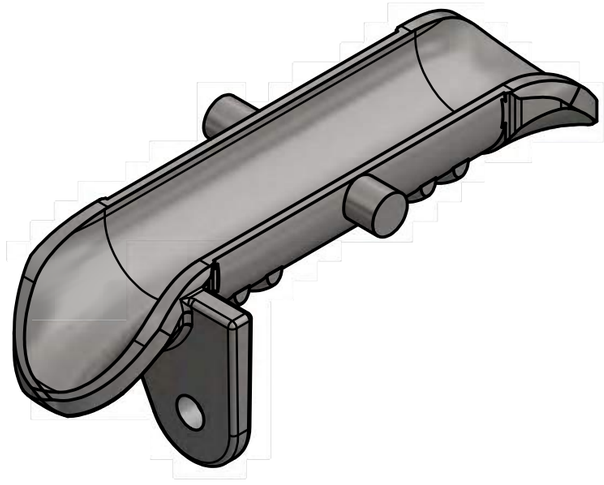
SECTION D - D





SECTION E - E



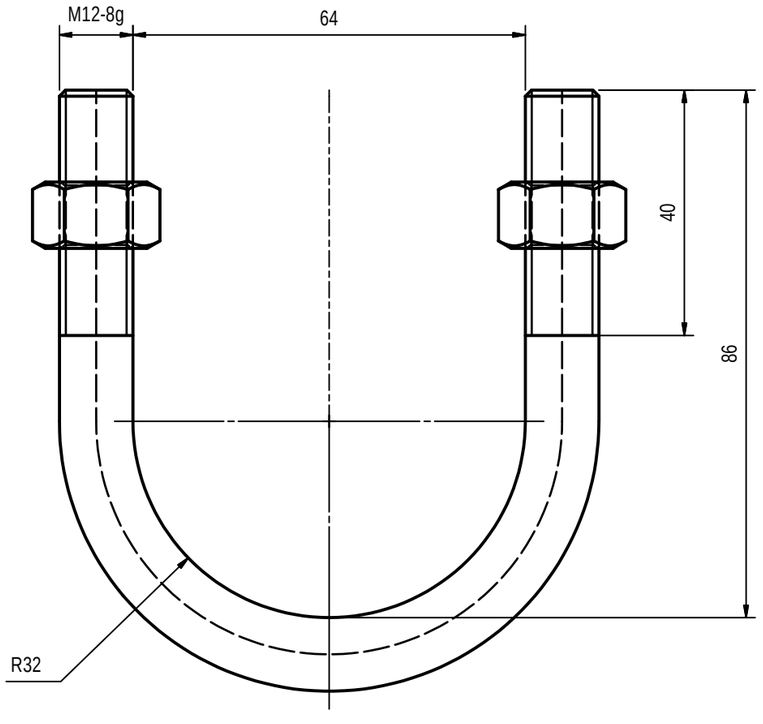


NOTE
THIS ITEM TO BE HOT DIPPED GALVANIZED TO SANS 121.

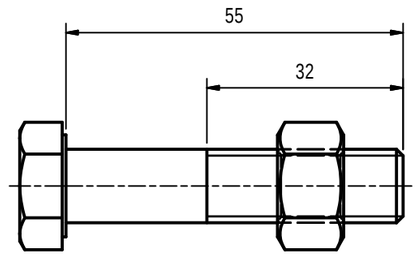
DIMENSIONS	: mm	SCALE : 1 : 2	
TOLERANCE	: LIN ± 1 ANG ± 1°		
MATERIAL	: SPERIODAL GRAPHITE IRON TO SPEC SANS 0936 GRADE SG 50.		
DRAWN	: D HATTINGH	CHECKED : D HATTINGH	

CRADLE FOR FEEDER WIRES
500mm² - 800mm²

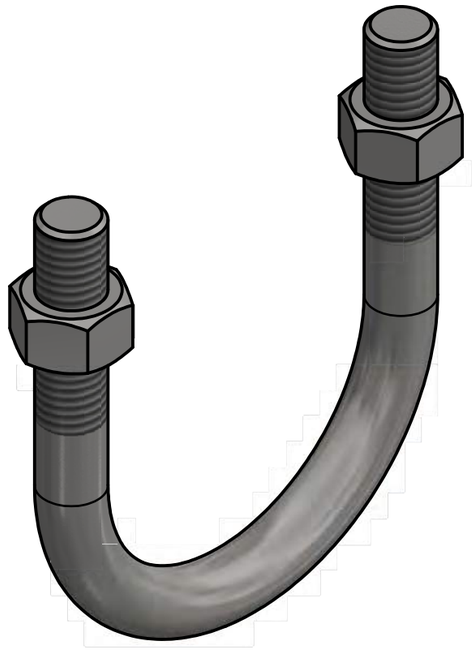
TRANSNET freight rail
CEE-TNB-0074 SHT 4
VERSION 2 A3

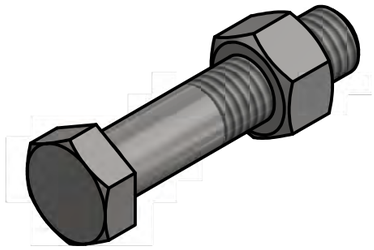


ITEM 1



ITEM 2





ITEM	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
2	BOLT, STEEL GRADE 8.8, M12 x 55L, COMPLETE WITH STEEL HEX NUT, M12, GALVANIZED TO SANS 121	1	-	-
1	STEEL ROUND Ø12, HEX NUT M12, GALVANIZED TO SANS 121	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN ± 0,5 ANG ± 0,5°
MATERIAL : -

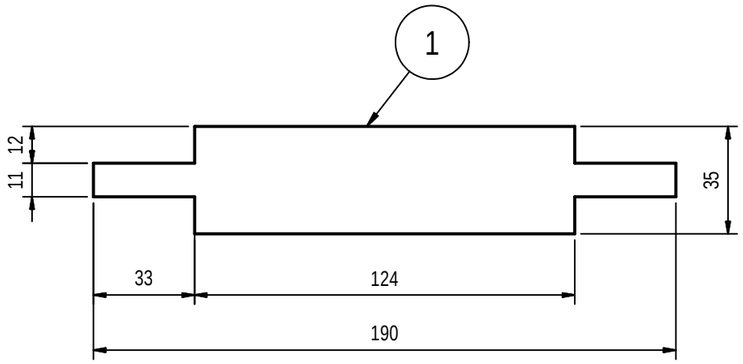
DRAWN : D HATTINGH CHECKED : D HATTINGH

U-BOLT AND BOLT

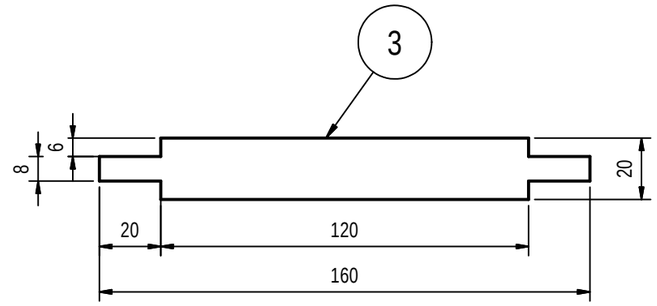
TRANSNET freight rail

CEE-TNB-0074 SHT 5

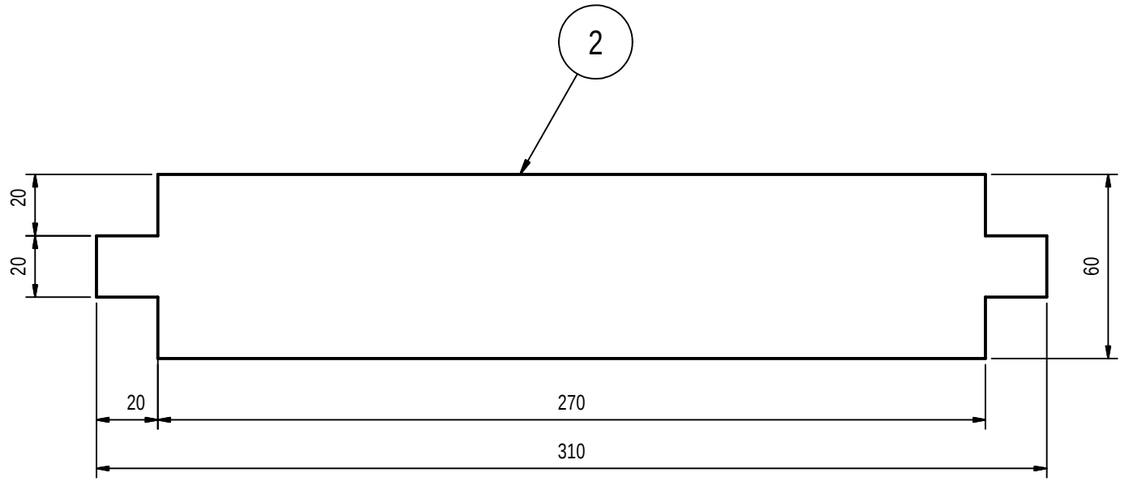
VERSION 2 A3



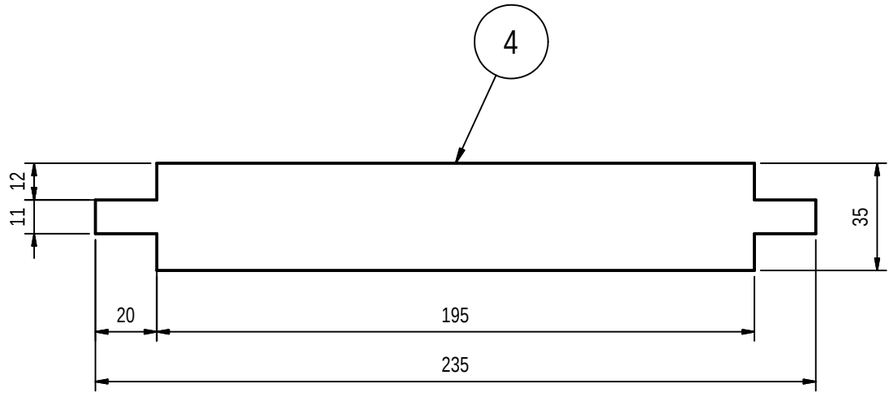
FEEDER UPPER LINER



CATENARY UPPER LINER



FEEDER LOWER LINER



CATENARY LOWER LINER

NOTE
ITEM 3 AND 4 TO BE USED WITH 162mm² ACSR CATENARY WIRES.

ITEM	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
4	SOFT ANNEALED ALUMINIUM TO SPEC. EN 485 GRADE AW 1200 H111, 235 x 35 x 1,2 THICK	1	-	-
3	SOFT ANNEALED ALUMINIUM TO SPEC. EN 485 GRADE AW 1200 H111, 160 x 20 x 1,2 THICK	1	-	-
2	SOFT ANNEALED ALUMINIUM TO SPEC. EN 485 GRADE AW 1200 H111, 310 x 50 x 1,8 THICK	1	-	-
1	SOFT ANNEALED ALUMINIUM TO SPEC. EN 485 GRADE AW 1200 H111, 190 x 35 x 1,2 THICK	1	-	-

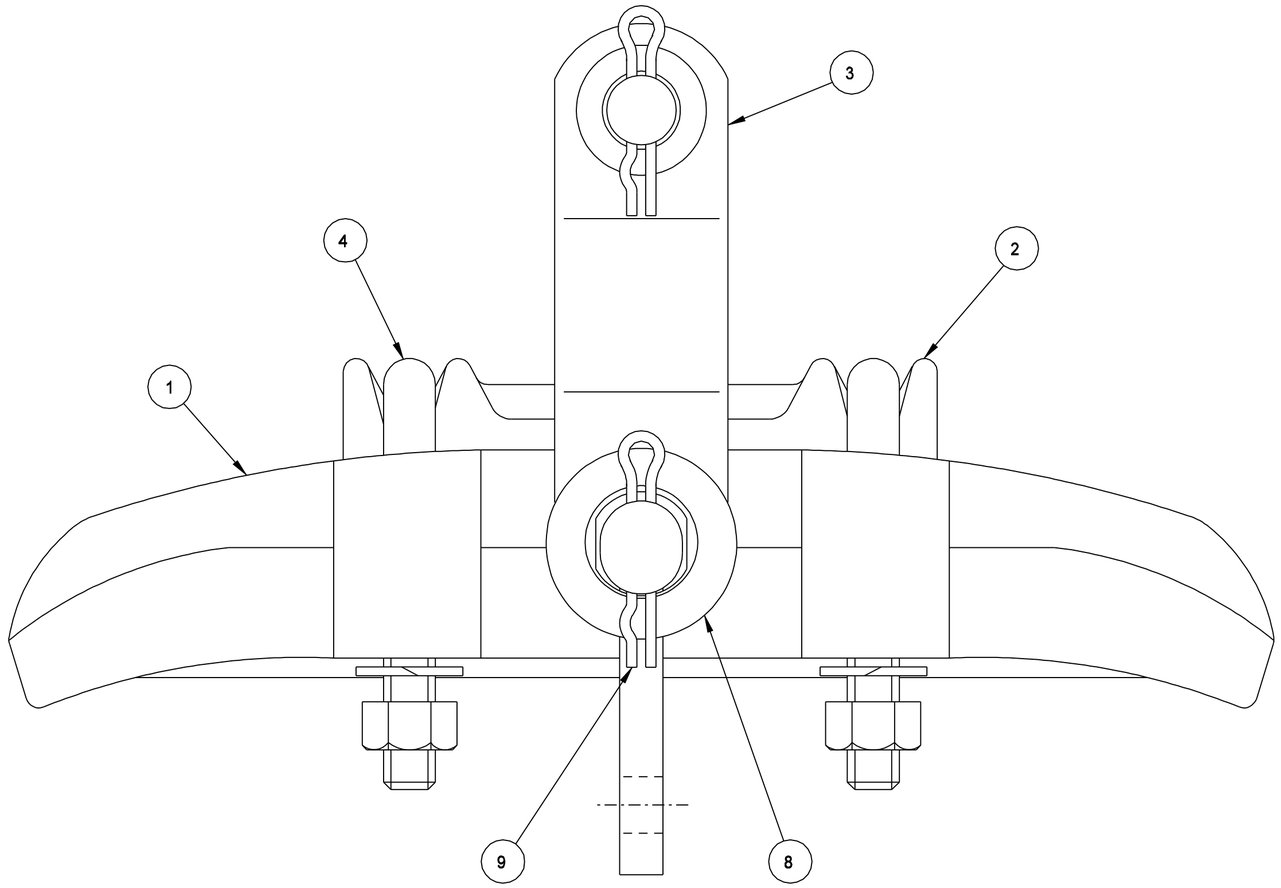
DIMENSIONS : mm SCALE : 1 : 2
TOLERANCE : LIN ± 0,5 ANG ± -
MATERIAL : ANNEALED ALUMINIUM TO SPEC. EN 485 GRADE AW 1200 H111
DRAWN : D HATTINGH CHECKED : D HATTINGH

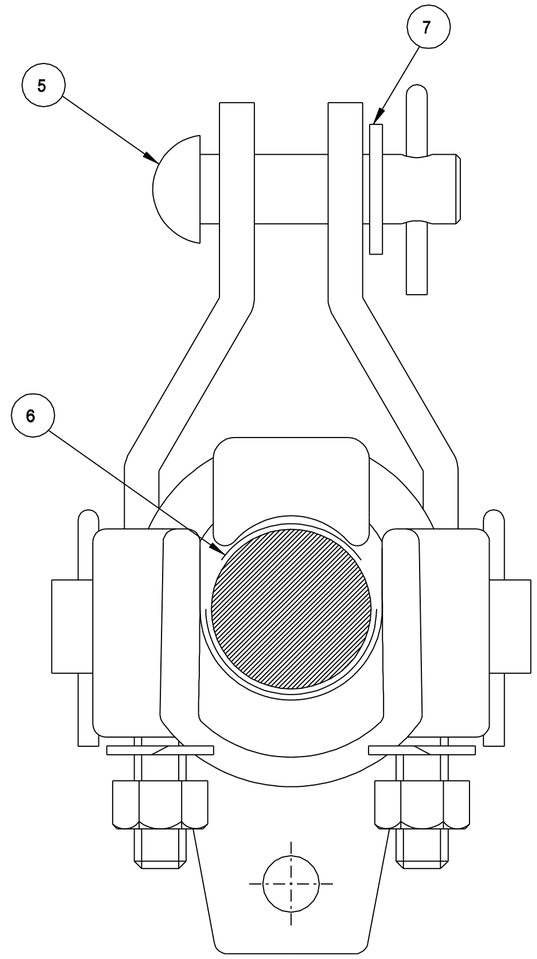
UPPER AND LOWER LINERS

TRANSNET freight rail
CEE-TNB-0074 SHT 6
VERSION 2 A3

ITEM	DESCRIPTION	QTY	STORES NO	DRG NO CEE-
1	CRADLE	1	———	TNB-91 SHT 2
2	SADDLE	1	———	TNB-91 SHT 3
3	LINK STRAP	2	———	TNB-91 SHT 4
4	U-BOLT, M12	2	———	TNB-91 SHT 5
5	PIN, STRAIGHT, HEADED, Ø16	1	———	TX-66
6	LINERS	2	———	TNB-91 SHT 6
7	WASHER, STEEL, ROUND, GALV. M16	1	01/33660	———
8	WASHER, STEEL, ROUND, GALV. M24	2	01/33684	———
9	LOCKING SPLIT PIN	3	54/3734	TX-54

AMENDMENTS		
NO	NAME	DATE





NOTES

1. IDENTIFICATION: CLAMP MUST BE PERMANENTLY MARKED WITH MAKERS IDENTIFICATION AND MONTH AND YEAR OF MANUFACTURE.
2. MINIMUM ULTIMATE STRENGTH: 70kN.
3. THIS ARTICLE MUST BE MANUFACTURED UNDER THE MARK OF THE SABS.
4. ZINC COAT TO SPEC SABS 763 FOR CONDITIONS IN SITU.

DO REF: T98/027	GEN TOL: LIN± -	ANG± -
DRN: JR ANTHONY	CKD: JVT	DATE: 98-07-15
ENG: HA SLIER	HA SLIER	for CHIEF ENG
CENTRAL DRAWING OFFICE	SPOORNET	

SINGLE SUSPENSION CLAMP ASSY

500 / 800mm² CONDUCTORS

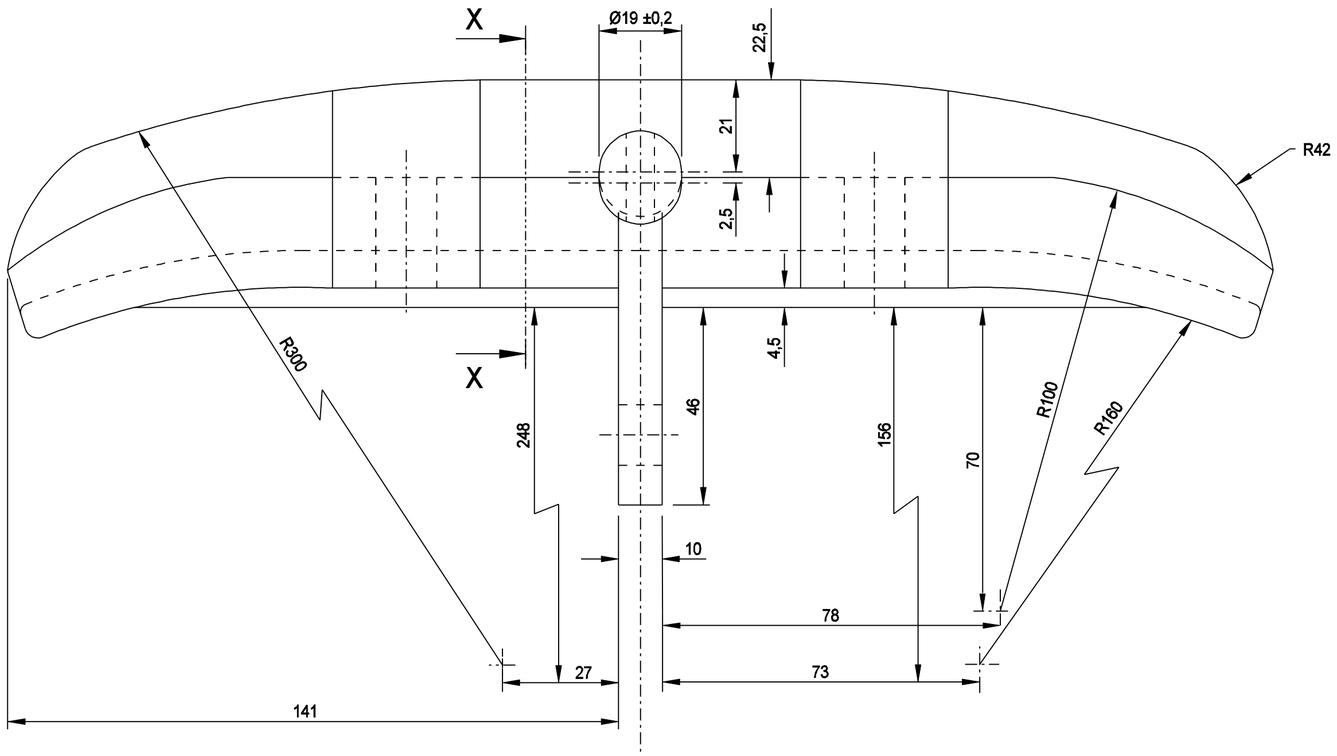
STORES ITEM NO
54/21980

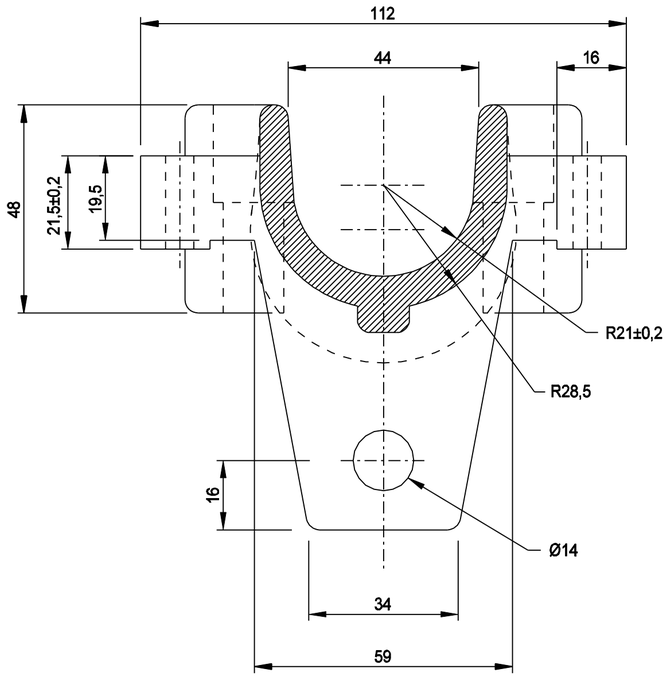
DIMENSIONS: mm
SCALE: 1:1

A2

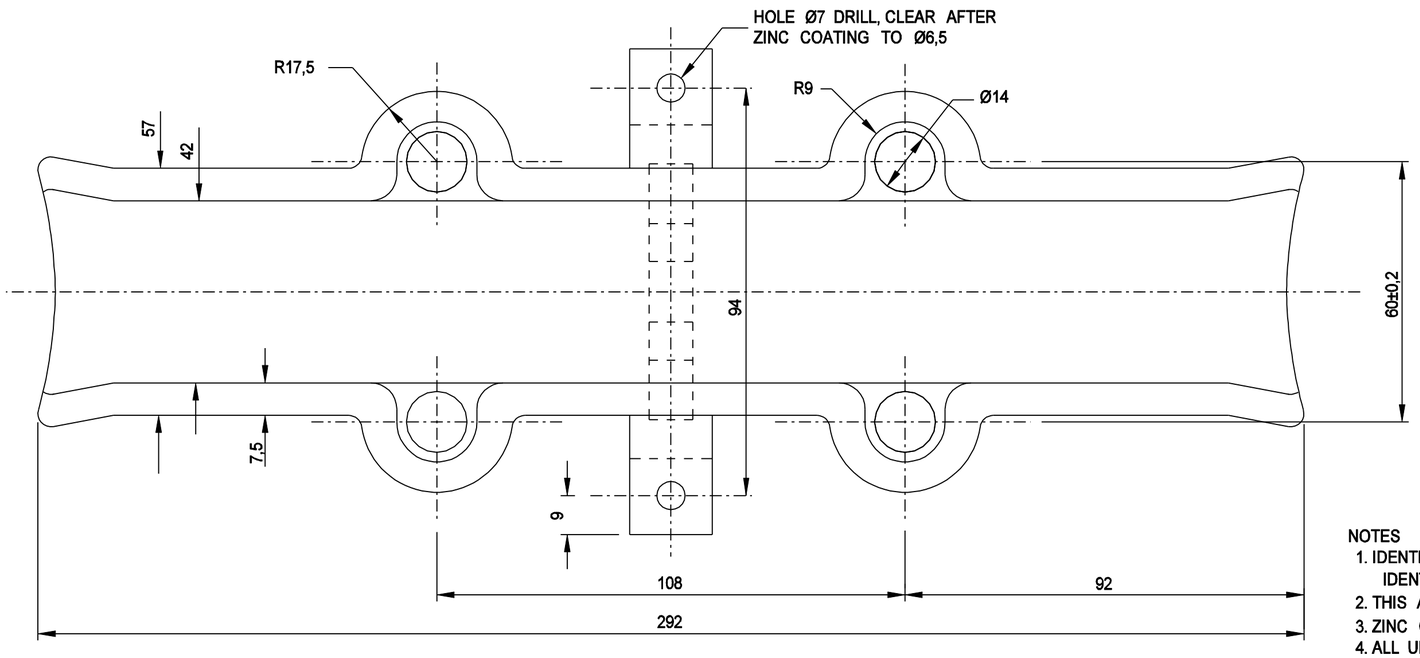
DRAWING NO CEE-TNB-91

SHEET 1 OF 6





SECTION X-X



NOTES
1. IDENTIFICATION: CRADLE MUST BE PERMANENTLY MARKED WITH MAKERS IDENTIFICATION AND MONTH AND YEAR OF MANUFACTURE.
2. THIS ARTICLE MUST BE MANUFACTURED UNDER THE MARK OF THE SABS.
3. ZINC COAT TO SPEC SABS 763 FOR CONDITIONS IN SITU.
4. ALL UNSPECIFIED RADII R3.

AMENDMENTS		
NO	NAME	DATE
1	HA SLIER	99-01-15

DIMENSION 44 ADDED.
RADII CENTRES ADDED.
DO REF: T98/045

MATERIAL: SPHEROIDAL GRAPHITE IRON TO SABS 936 GRADE SG 50			
DO REF: T98/027	GEN TOL: LIN± 1		ANG± -
DRN: GA ERASMUS	CKD: JVT	DATE:	98-07-15
ENG: HA SLIER	HA SLIER		for CHIEF ENG
CENTRAL DRAWING OFFICE	SPOORNET		

CRADLE

SINGLE SUSPENSION CLAMP

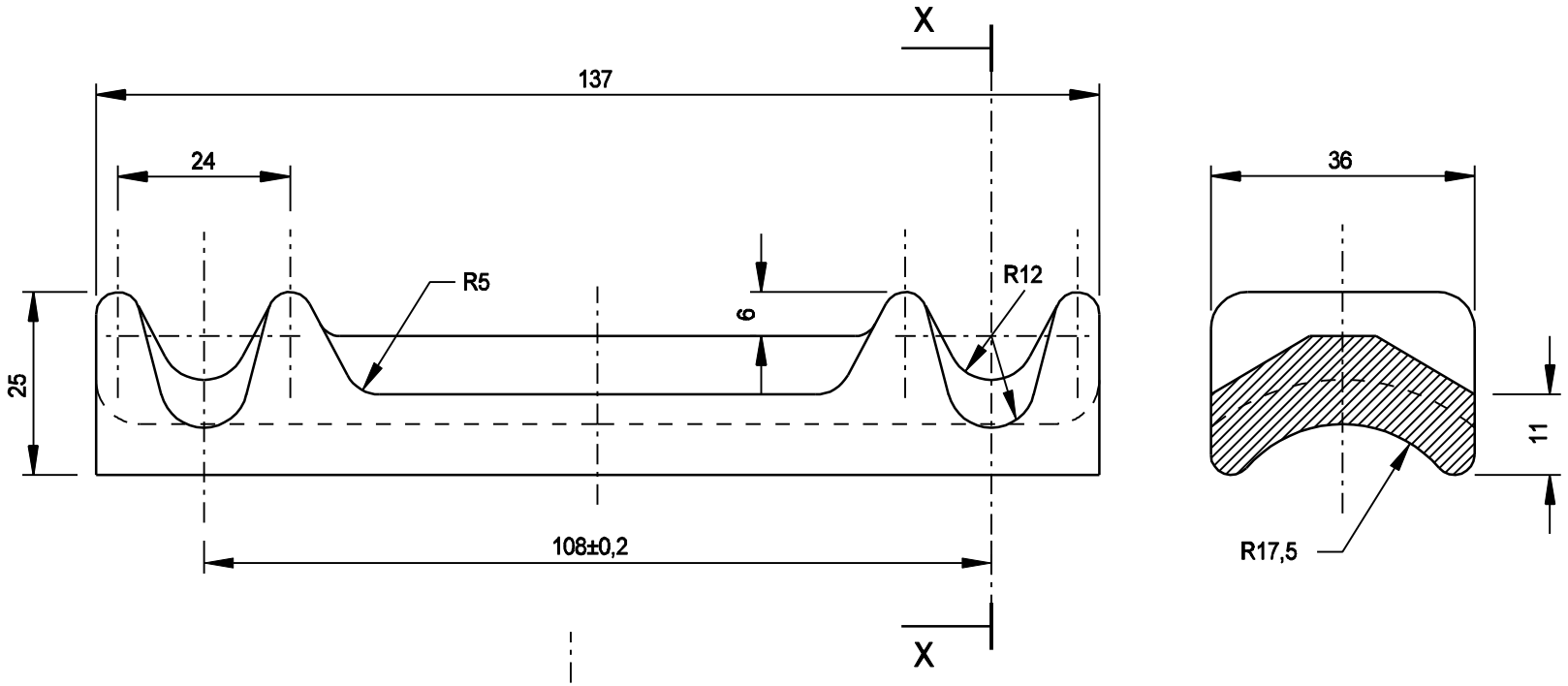
500 / 800mm² CONDUCTORS

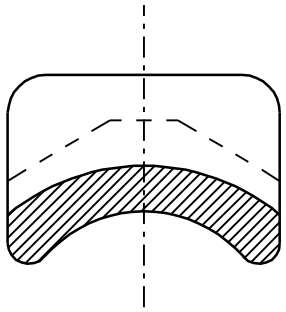
DIMENSIONS: mm
SCALE: 1:1

A2

DRAWING NO CEE-TNB-91

SHEET 2 OF 6





SECTION X-X

NOTES
1. ZINC COAT TO SPEC SABS 763 FOR CONDITIONS IN SITU.
2. ALL UNSPECIFIED RADII R3.

AMENDMENTS		
NO	NAME	DATE
1	HA SLIER	99-01-15

STRESS RELIEF RADII ADDED.
DO REF: T98/045

DIMENSIONS: mm
SCALE: 1:1

MATERIAL: SPHEROIDAL GRAPHITE IRON TO SABS 936 GRADE SG 50

DO REF: T98/027	GEN TOL: LIN± 1	ANG± -
DRN: JVT	CKD: JVT	DATE: 98-7-15
ENG: HA SLIER	HA SLIER	for CHIEF ENG

CENTRAL DRAWING OFFICE

SPOORNET

SADDLE

SINGLE SUSPENSION CLAMP

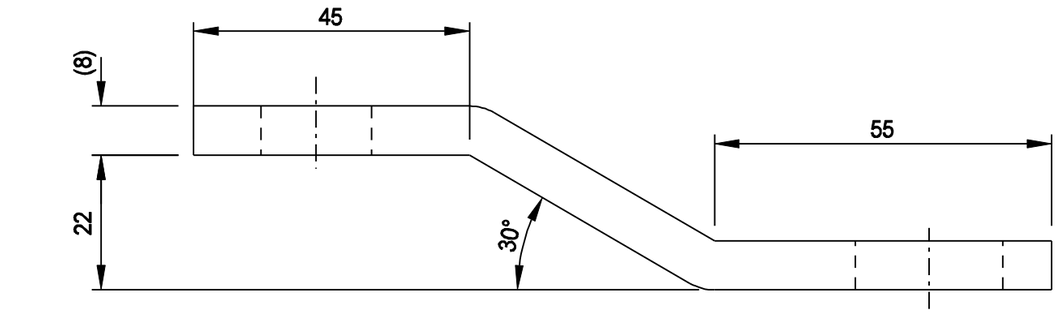
500 / 800mm² CONDUCTORS

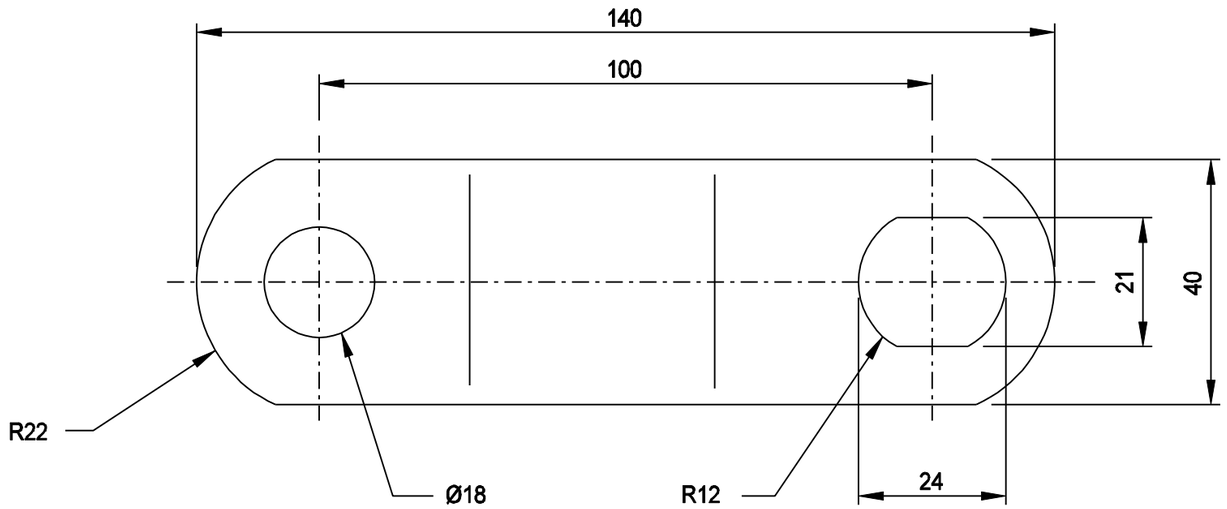
A4

DRG NO CEE-TNB-91

SHT 3 OF 6

AMENDMENTS		
NO	NAME	DATE





FINISH
ZINC COAT TO SPEC SABS 763 FOR CONDITIONS IN SITU.

DIMENSION: mm
SCALE: 1:1

MATERIAL: ITEM NO ——— STEEL, FLAT, 143 x 50 x 8 THK

DO REF: T98/027	GEN TOL: LIN± 0,5	ANG± 1°
DRN: JVT	CKD: JVT	DATE: 98-07-15
ENG: HA SLIER	HA SLIER	for CHIEF ENG

CENTRAL DRAWING OFFICE SPOORNET

LINK STRAP

SINGLE SUSPENSION CLAMP

500 / 800mm² CONDUCTORS

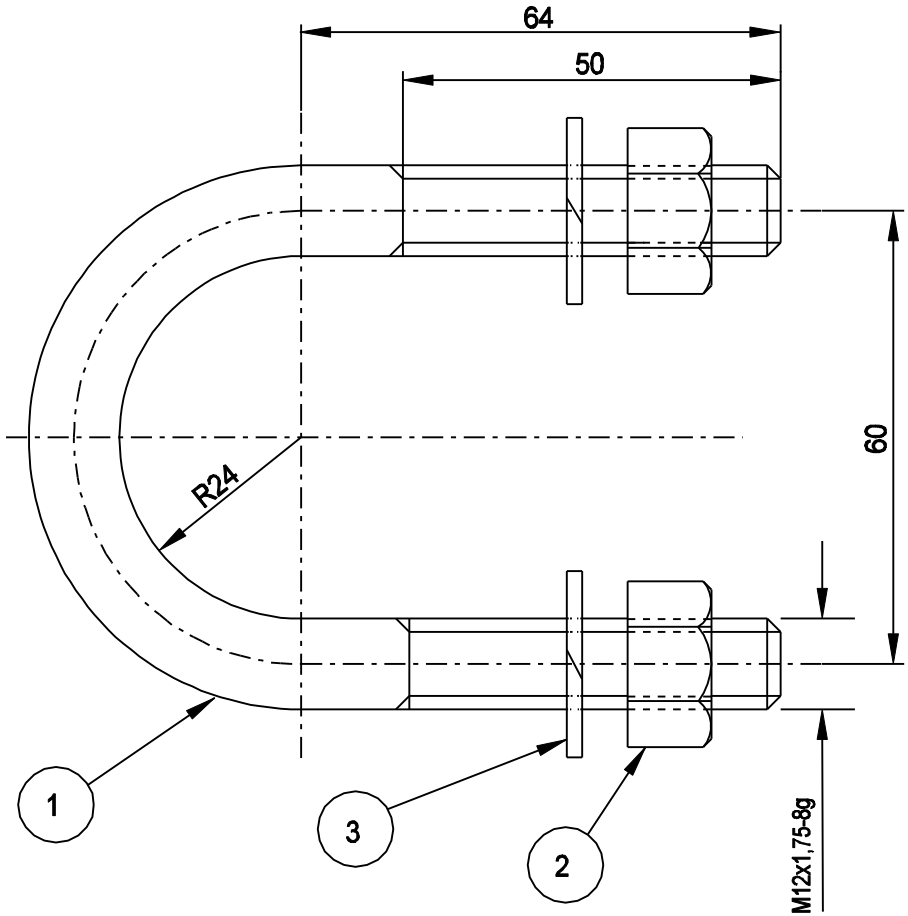
A3

DRAWING NO CEE-TNB-91

SHEET 4 OF 6

ITEM	DESCRIPTION	QTY	STORES NO
1	STEEL, ROUND Ø12 x 225LG	1	11/2740
2	NUT, PLAIN, HEX, STEEL GALV. M12	2	1/32856
3	WASHER, SPRING, STEEL, GALV. M12	2	1/-

AMENDMENTS		
NO	NAME	DATE



FINISH

ZINC COAT TO SPEC SABS 763
FOR CONDITIONS IN SITU.

DIMENSIONS: mm
SCALE: 1:1

A4

DO REF: T98/027	GEN TOL: LIN± 0,5	ANG± —
DRN: JVT	CKD: JVT	DATE: 98-7-15
ENG: HA SLIER	HA SLIER	for CHIEF ENG

CENTRAL DRAWING OFFICE

SPOORNET

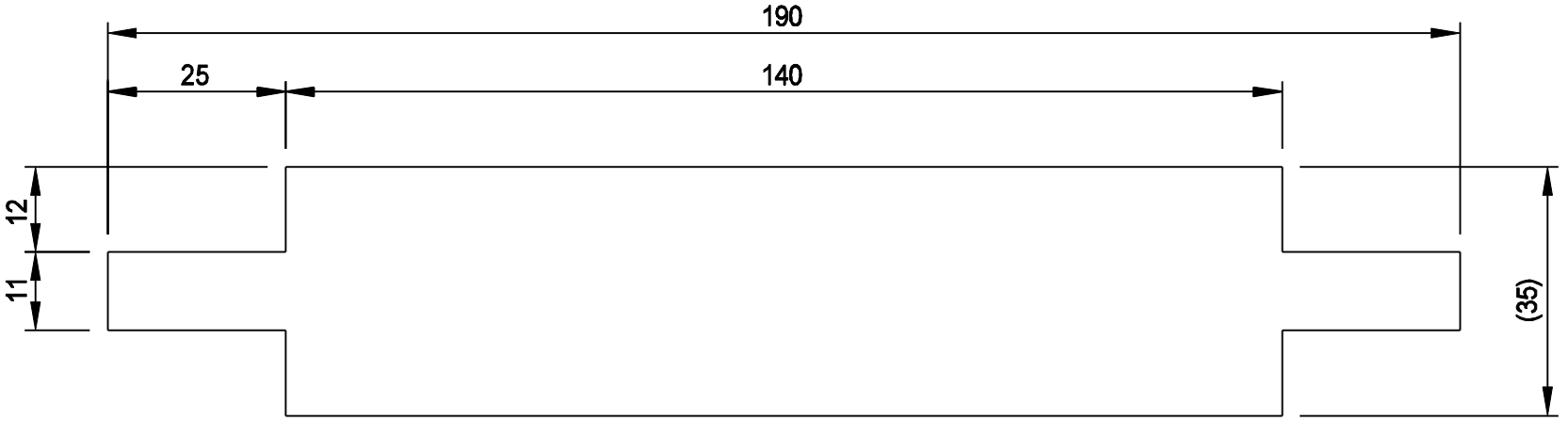
U-BOLT M12

SINGLE SUSPENSION CLAMP

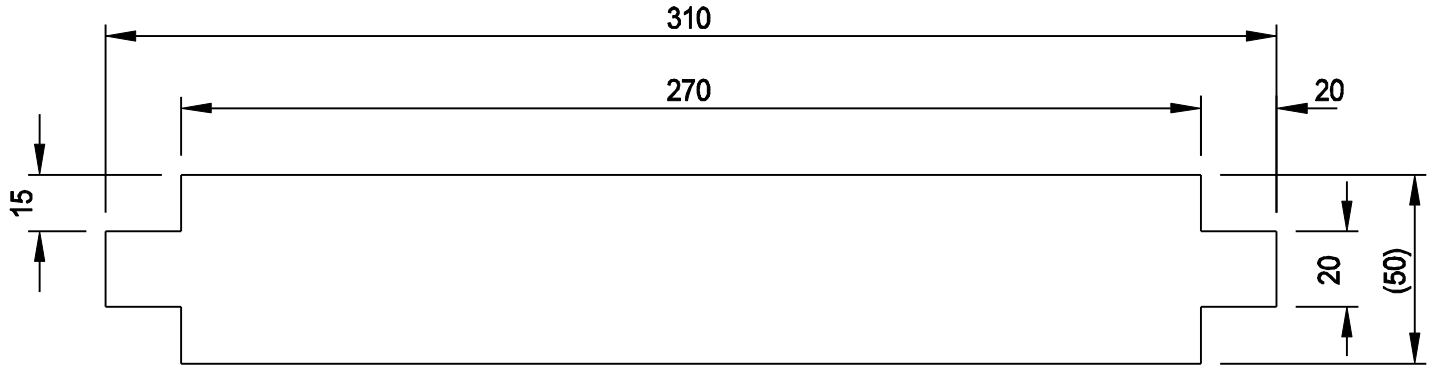
500 / 800mm² CONDUCTORS

DRG NO CEE-TNB-91

SHT 5 OF 6



ITEM 1: UPPER LINER



ITEM 2: LOWER LINER

SCALE: 1:2

AMENDMENTS		
NO	NAME	DATE

DIMENSIONS: mm
SCALE: 1:1

MATERIAL: SOFT ANNEALED PURE ALUMINIUM, 1,2 THICK TO B.S.1470 GRADE S1C CON. 0

DO REF: T98/027	GEN TOL: LIN± 1	ANG± -
DRN: JVT	CKD: JVT	DATE: 98-7-15
ENG: HA SLIER	HA SLIER	for CHIEF ENG

CENTRAL DRAWING OFFICE

SPOORNET

LINERS

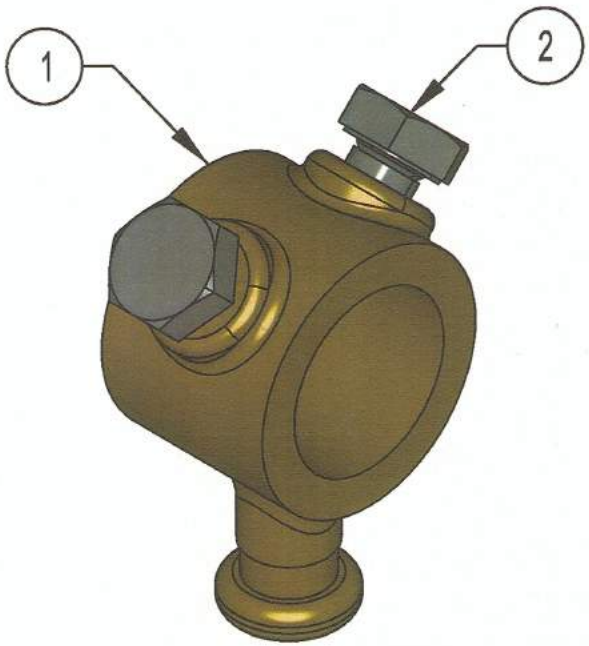
SINGLE SUSPENSION CLAMP

500 / 800mm² CONDUCTORS

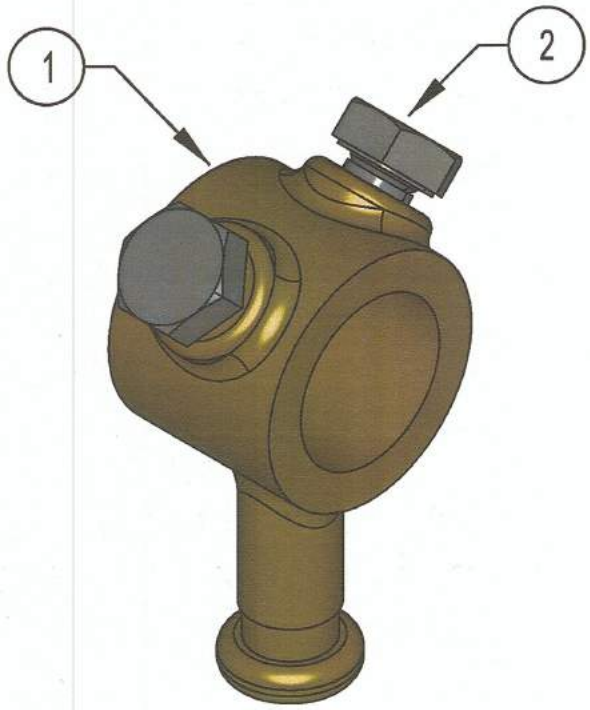
A4

DRG NO CEE-TNB-91

SHT 6 OF 6



SWIVEL FITTING
FOR STEADY ARM



SWIVEL FITTING
FOR KNUCKLE

NOTE
SWIVEL CLAMP TO SPECIFICATION CEE 0063.

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
2	BOLT, HEXAGON, STAINLESS STEEL TO SPEC CEE 0063, M10	2	-	-
1	SWIVEL CLAMP BODY FOR STEADY ARM	1	-	CEE-TND-0001 SHT 1
	SWIVEL CLAMP BODY FOR KNUCKLE	1	-	CEE-TND-0001 SHT 2

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG±1° ITEM NO : -
MATERIAL : Cu-Ni-Si TO SPEC CEE 0063 ALT.
STAINLESS STEEL TO SPEC AISI GRADE 304.
VERSION INFO : REDRAW AND REVISED.

03/10/2019
APPROVED: S SMIT

3-10-2019
AUTHORISED: L O BORCHARD

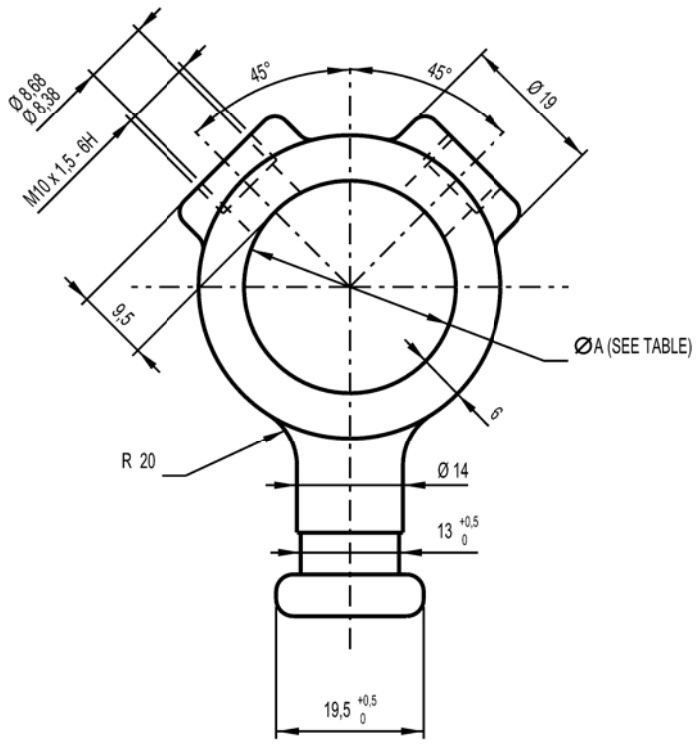
SWIVEL FITTING
KNUCKLE OR STEADY ARM
SWIVEL TYPE CONTACT WIRE CLAMP

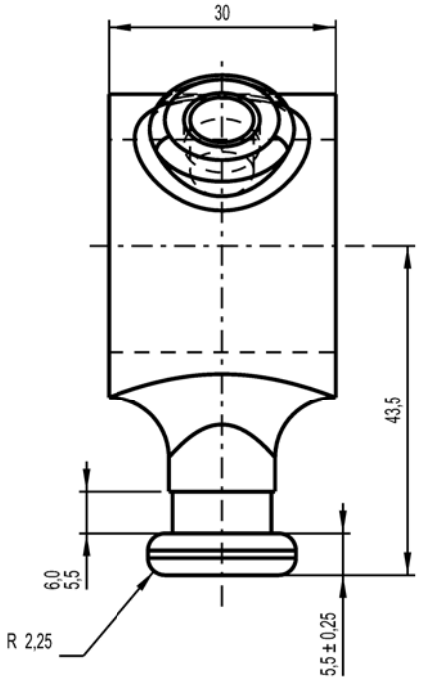
TRANSNET
freight rail

CEE-TND-0001
VERSION 5
A4

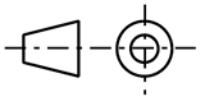
DO REF: CDO/ 6440 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH

APPLICATION	DIMENSION 'A'	STORES ITEM NO.
GENERAL	$26^{+0,5}_{0}$	54033595
COAL LINK ONLY	$28^{+0,5}_{0}$	54033611





NOTES
1. SWIVEL CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
3. ALL UNSPECIFIED RADII R2.
4. REMOVE ALL BURRS.



DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 1°
MATERIAL : Cu-Ni-Si TO SPEC CEE 0063 ALT.
STAINLESS STEEL TO SPEC AISI GRADE 304.

DRAWN : D HATTINGH CHECKED : D HATTINGH

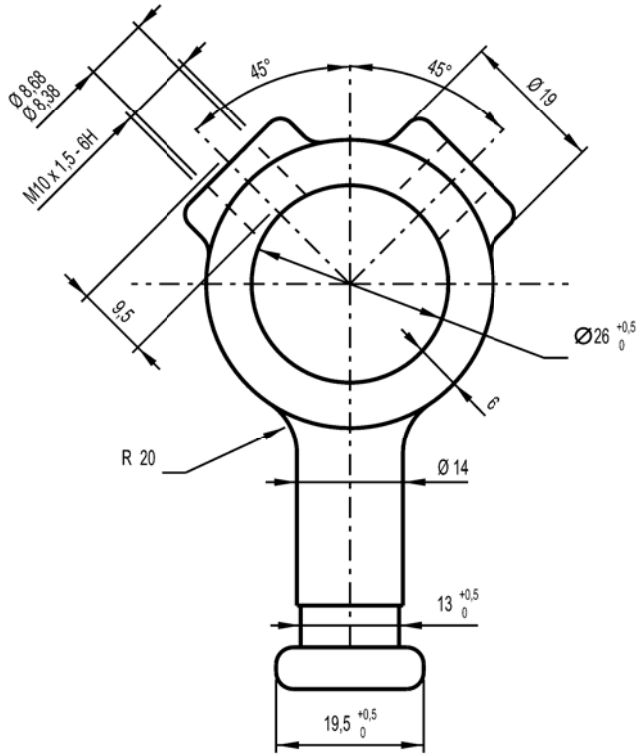
SWIVEL FITTING FOR STEADY ARM SWIVEL TYPE CONTACT WIRE CLAMP

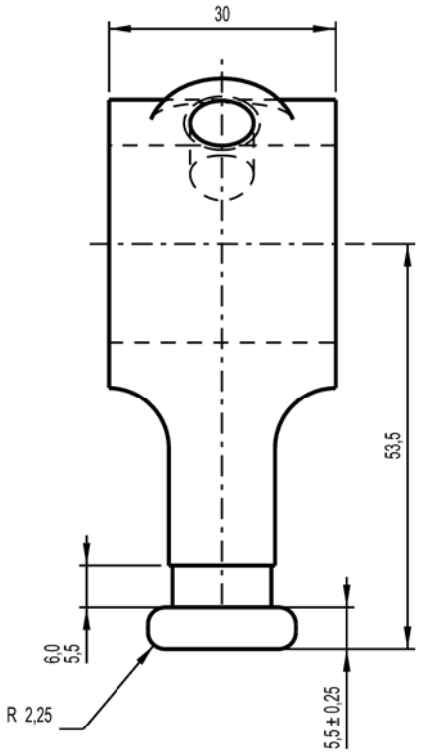
TRANSNET freight rail

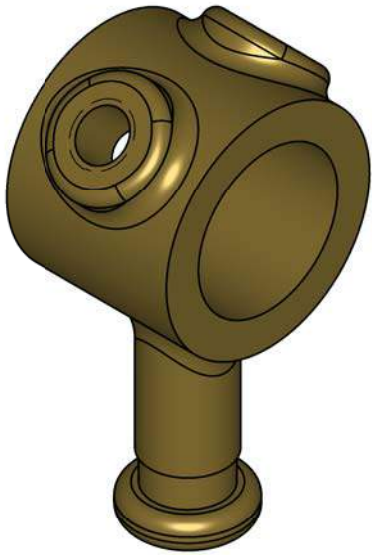
CEE-TND-0001 SHT 1

VERSION 5

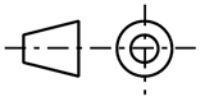
A4







NOTES
1. SWIVEL CLAMP TO SPECIFICATION CEE 0063.
2. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   a) TRANSNET LOGO.
   b) MANUFACTURERS IDENTIFICATION.
   c) DATED BATCH NUMBER.
3. ALL UNSPECIFIED RADII R2.
4. REMOVE ALL BURRS.



DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± 0,5 ANG± 1°
MATERIAL : Cu-Ni-Si TO SPEC CEE 0063 ALT.
STAINLESS STEEL TO SPEC AISI GRADE 304.

DRAWN : D HATTINGH CHECKED : D HATTINGH

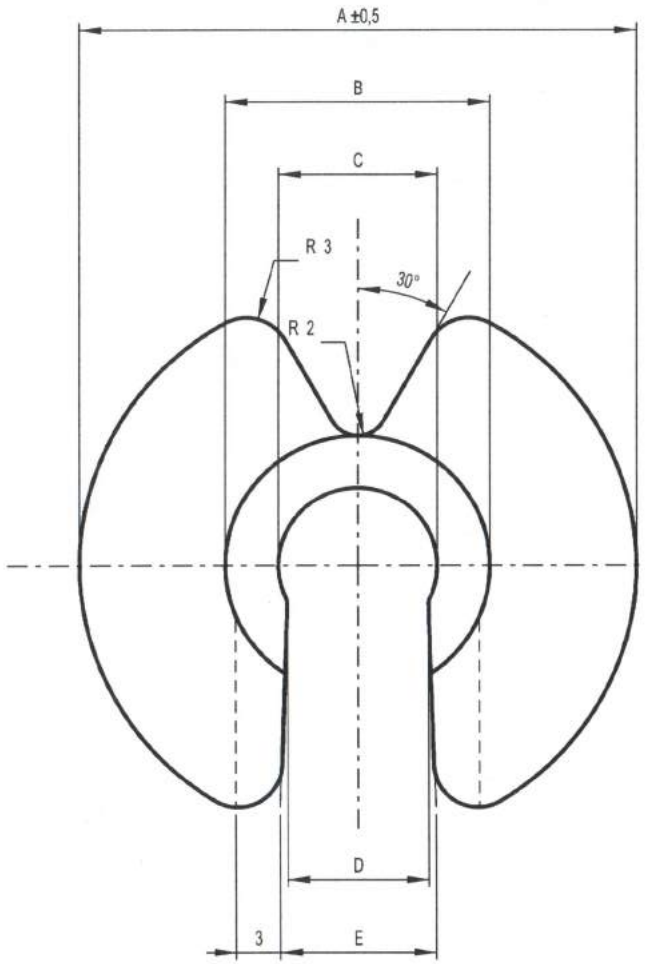
SWIVEL FITTING FOR KNUCKLE SWIVEL TYPE CONTACT WIRE CLAMP

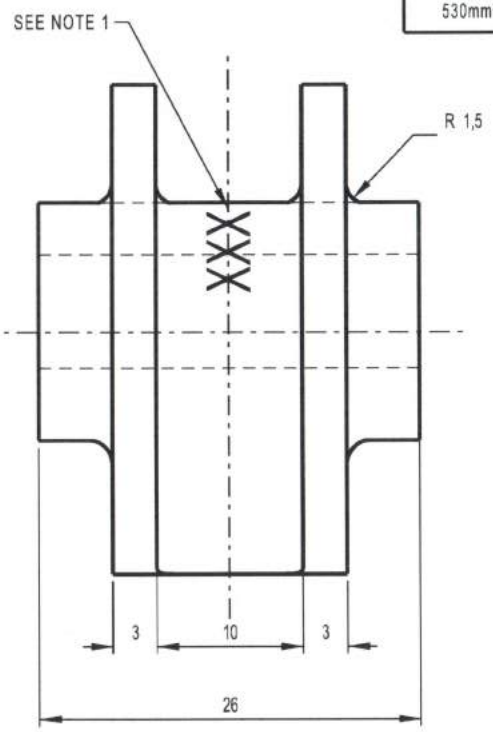
TRANSNET freight rail

CEE-TND-0001 SHT 2

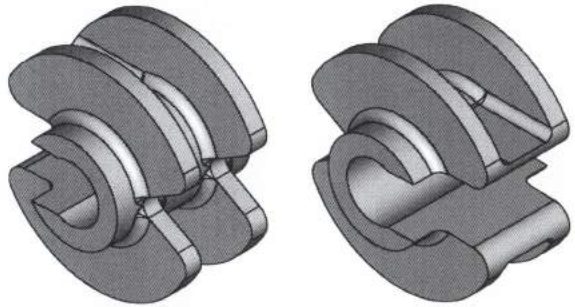
VERSION 5

A4





CATENARY	ACSR CODE NAME	A	B	C	D	E	ITEM NO.
80mm²	-	Ø38	Ø18	Ø10,8	9.6	10,6 ±1	54006840
100mm²	SKUNK	Ø40,8	Ø20,8	Ø12,8	11,4	12,6 ±1	54016861
148mm²	LEOPARD	Ø44,5	Ø24,5	Ø15,5	13,9	15,3±1	-
160mm²	TIGER	Ø46.7	Ø26,7	Ø16,2	14,4	16 ±1	54016836
250mm²	-	Ø54	Ø33,9	Ø20,5	18,2	20,0 ±1,5	54016848
530mm²	DEER	Ø68	Ø48,1	Ø29,4	26	28,5 ±1.5	54031701



NOTE

1. APPLICABLE CONDUCTOR SIZE " XXXmm² TO BE CAST OR PUNCHED IN POSITION SHOWN. (3mm CHARACTER HEIGHT)
2. A MANUFACTURERS IDENTIFICATION MARK MUST BE CAST OR PUNCHED ON THE CLIP.

DIMENSIONS : mm SCALE : 2:1
TOLERANCE : LIN± 0,2 ANG±0,5° ITEM NO : -
MATERIAL : NYLON 66 PIGMENT: BLACK

VERSION INFO : 148mm² CATENARY ADDED

+ 28/5/2020 APPROVED S. Smit

+ 28/5/2020 AUTHORISED S. Smit

CATENARY DROPPER CLIP
CLIP-ON TYPE

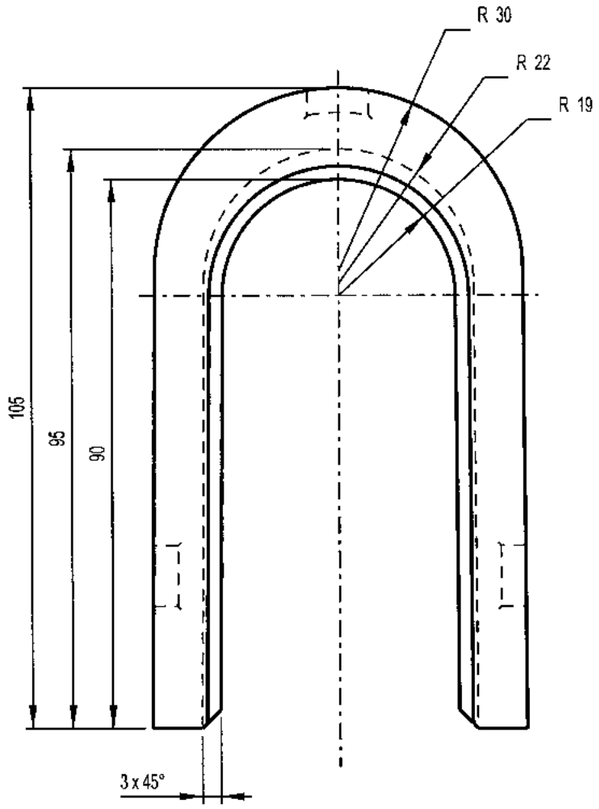
80mm², 100mm², 148mm², 160mm², 250mm² AND 530mm² CATENARIES

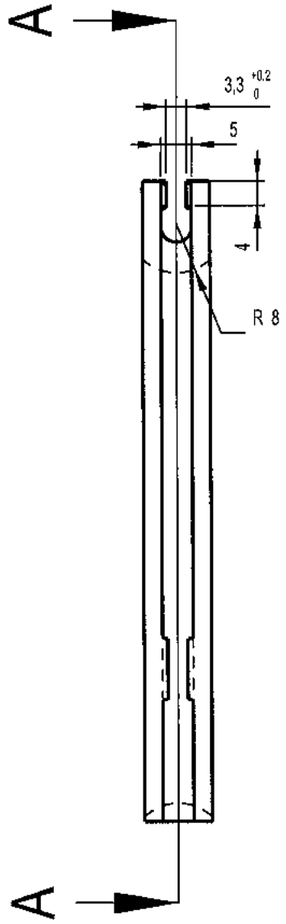
TRANSNET freight rail

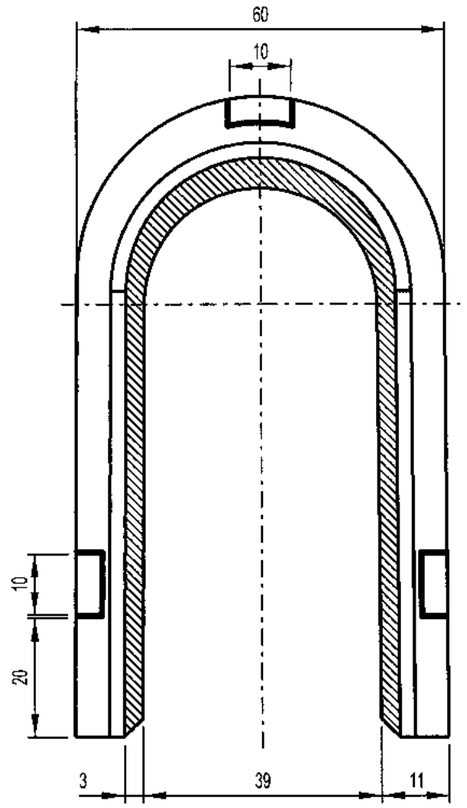
CEE-TND-0005

VERSION 7 A4

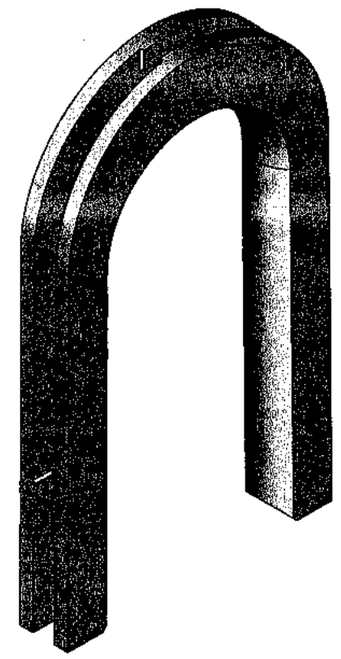
DO REF: CDO/ 9539 ECP REF: - DRAWN: S. MAZIBUKO DESIGNED: - CHECKED: S. MAZIBUKO

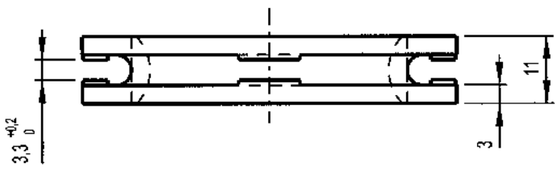






SECTION A-A

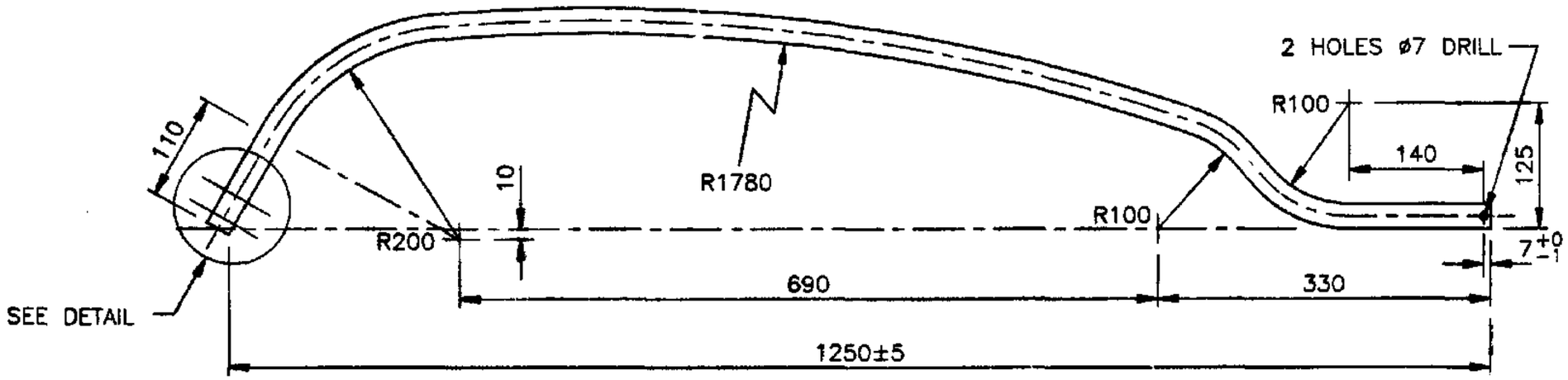


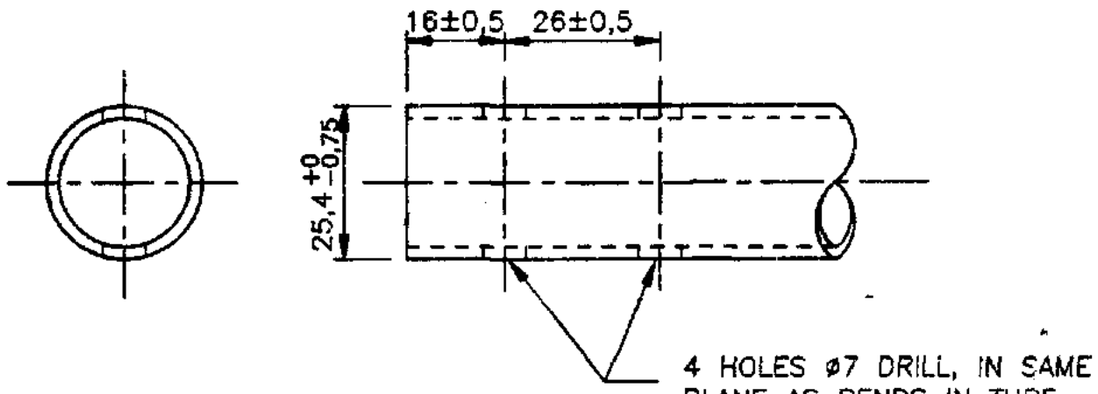


NOTE
THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
(a) MANUFACTURER'S IDENTIFICATION.
(b) DATED BATCH NUMBER.

DIMENSIONS : mm SCALE : 1 : 1 TOLERANCE : LIN± 0,5 ANG± 0,5° ITEM NO : 54017070 MATERIAL : NYLON 66. PIGMENT : BLACK VERSION INFO : REDRAWN	+ 18-9-2019 APPROVED : S SMIT	+ 18-9-2019 AUTHORISED : L O BORCHARD	PROTECTIVE SLEEVE LOOP DROPPER (CLIP-ON-TYPE)	TRANSNET freight rail CEE-TND-0011 VERSION 3 A3

DO REF: CDO/ 9424 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH





DETAIL

SCALE 1:1

AMENDMENTS		
NO	NAME	DATE
1	W. BRIGHT	92-09-28
16 DIM WAS 19. DRG. NO. WAS CEE-TN-151. DO REF: T92/045		
2	J van Dyk	94-06-23
REVISED AND UPDATED. DO REF: T94/025		

MATERIAL: STAINLESS STEEL TUBE 2,03 WALL THK TO SPEC AISI GRADE 304.

DO REF: T79/9	GEN TOL: LIN ± 3	ANG ± ——
DRN: A. JOUBERT	CKD: J. JACKSON	DATE: 79-11-22
ENG: ———	F. PIENAAR	for CHIEF ENG

INFRASTRUCTURE (ELECTRICAL)

SPOORNET

HOCKEY STICK: PULL-OFF TYPE

STORES ITEM NO 54/9298

DIMENSION: mm

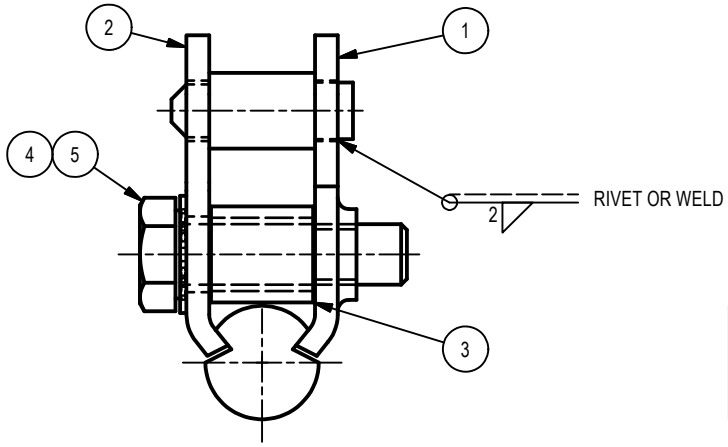
SCALE: 1:5

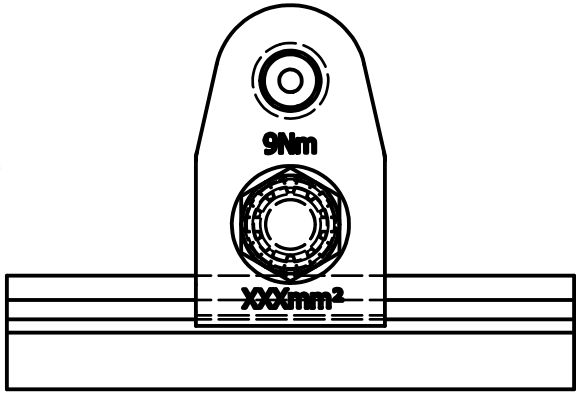
A3

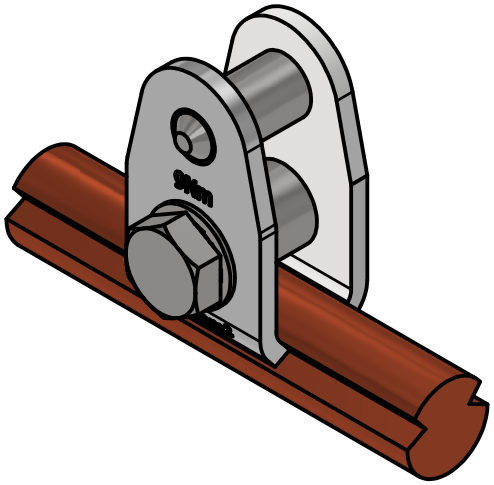
DRAWING NO CEE-TND-20

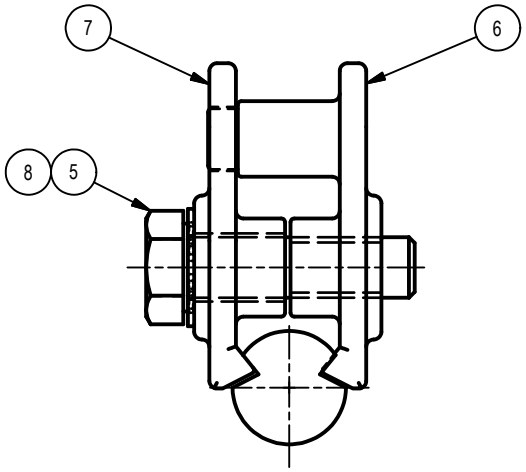
SHEET — OF —

T0XXX581









ALTERNATIVE DROPPER CLIP

TABLE 1	
CONTACT WIRE	STORES ITEN NO.
161mm²	54017312
107mm²	54006787

TABLE 2		
CONTACT WIRE	ITEM NO	BOLT LENGTH
107mm²	8	25mm
161mm²	8	30mm

NOTES
1. STOPPER TO PREVENT OVER TORQUE, STOPPER MAY NOT INTERFERE WITH CONTACT WIRE.
2. ASSEMBLES DROPPER MINIMUM WORKING LOAD OF 4kN.
3. ASSEMBLED DROPPER CLIP MUST BE PERMANENTLY MARKED WITH THE FOLLOWING
   (a) TRANSNET LOGO
   (b) MANUFACTURERS IDENTIFICATION.
   (c) DATED BATCH NUMBER.
   (d) WIRE SIZES.
   (e) TORQUE = 9Nm.

ITEM NO.	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
8	HEXAGON BOLT, STAINLESS STEEL, GRADE AISI 304, M8 x SEE TABLE 2.	1	-	-
7	HALF DROPPER CLIP WITHOUT THREAD. (TIN-BRASS)	1	-	CEE-TND-0022 SHT 2
6	HALF DROPPER CLIP WITH THREAD (TIN-BRASS)	1	-	CEE-TND-0022 SHT 2
5	LOCK WASHER, INTERNAL TOOTH, STAINLESS STEEL, AISI GRADE 316, M8	1	-	-
4	HEXAGON BOLT, STAINLESS STEEL, GRADE AISI 316, M8 x 30mm LONG.	1	-	-
3	STOPPER.	1	-	CEE-TND-0022 SHT 1
2	HALF DROPPER CLIP WITHOUT THREAD.	1	-	CEE-TND-0022 SHT 1
1	HALF DROPPER CLIP WITH THREAD AND SPACER PIN ASSEMBLY	1	-	CEE-TND-0022 SHT 1

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN ± - ANG ± - ITEM NO : -
MATERIAL : -

VERSION INFO : ITEM 6 AND 7 ADDED.

29/02/2024
APPROVED : W SCHOEMAN

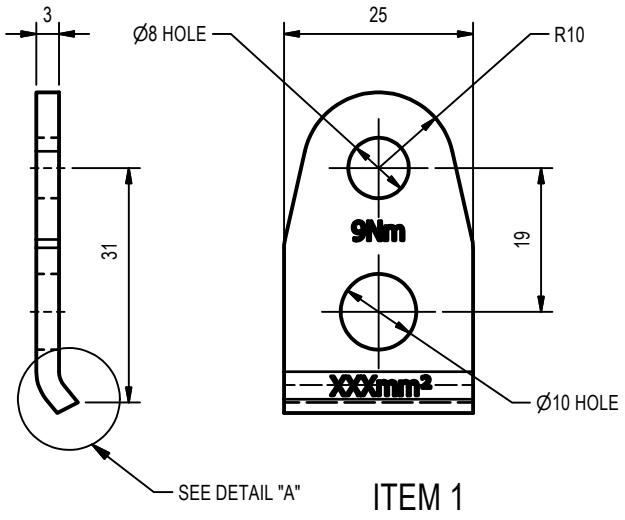
AUTHORISED : T GOVENDER

DROPPER CLIP
107mm² / 161mm² CONTACT WIRE

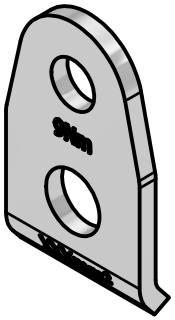
TRANSNET freight rail

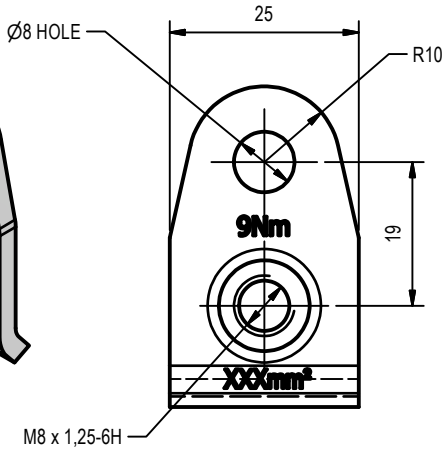
CEE-TND-0022
VERSION 8 A4

DO REF : CDO/E0471 ECP REF : - DRAWN : D HATTINGH DESIGNED : - CHECKED : D HATTINGH

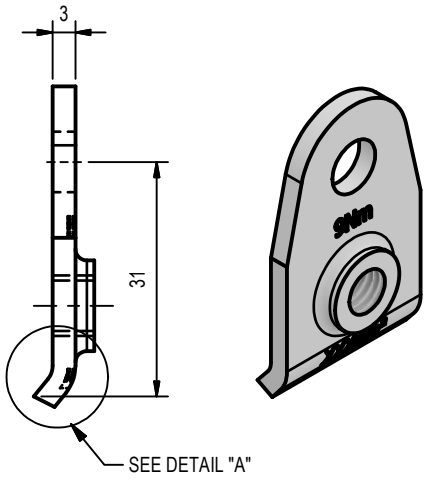


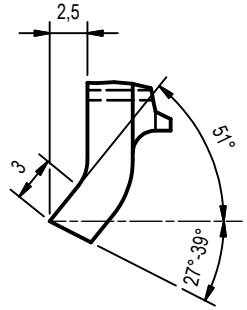
ITEM 1



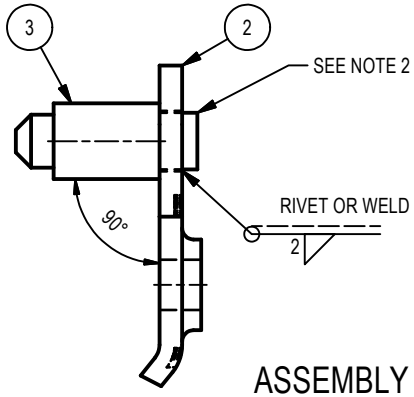


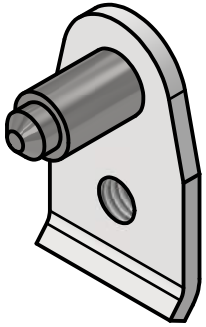
ITEM 2



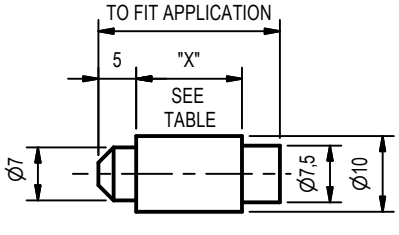


DETAIL "A"
SCALE 2 :1



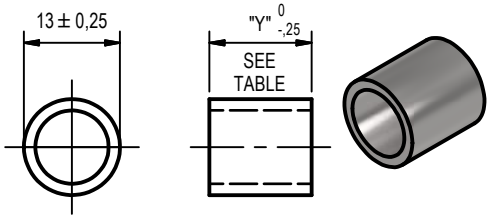


ASSEMBLY



ITEM 3

TABLE		
CONTACT WIRE	"X"	'Y'
107mm²	11	10,5
161mm²	14	13,5



ITEM 4
SEE NOTE 3

NOTES
1. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   (a) TRANSNET LOGO
   (b) MANUFACTURERS IDENTIFICATION.
   (c) DATED BATCH NUMBER.
   (d) WIRE SIZES.
   (e) TORQUE = 9Nm.
2. DRAW THROUGH FOR INCREASED THREAD LENGTH.
3. THE LENGTH OF THE TUBE MUST NOT INTERFERE WITH THE CLAMPING OF THE DROPPER CLIP.

ITEM NO.	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
4	STOPPER, STAINLESS STEEL TUBE TO AISI GRADE 304, Ø12,7 O.D. 1,5mm WALL THICKNESS.	1	-	-
3	SPACER PIN, ROUND BAR, STAINLESS STEEL TO AISI GRADE 304, Ø10 x 24mm LONG.	1	-	-
2	DROPPER CLIP WITH THREAD, STAINLESS STEEL TO AISI GRADE 304.	1	-	-
1	DROPPER CLIP WITHOUT THREAD, STAINLESS STEEL TO AISI GRADE 304.	1	-	-

DIMENSIONS : mm SCALE : 1 :1
TOLERANCE : LIN ± 0,5 ANG ± 1° ITEM NO : -
MATERIAL : -

DRAWN : D HATTINGH CHECKED : D HATTINGH

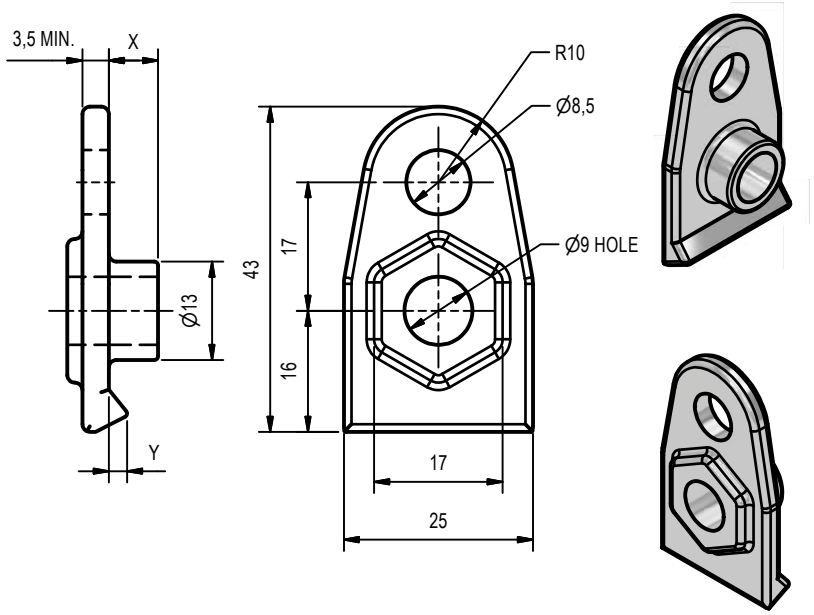
COMPONENTS OF 107mm² / 161mm² STAINLESS STEEL DROPPER CLIP

TRANSNET freight rail

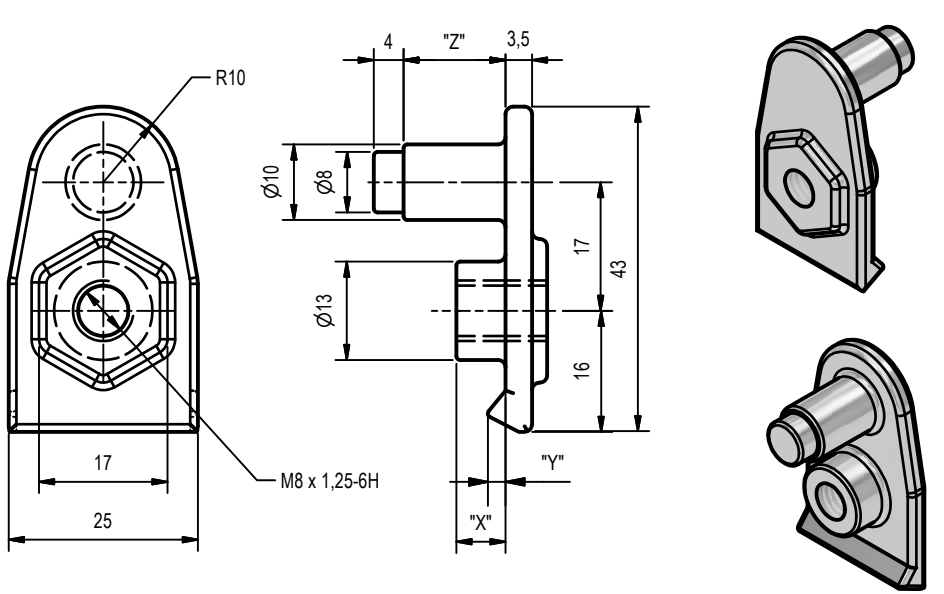
CEE-TND-0022 SHT 1

VERSION 8 A4

"THIS DRAWING CONTAINS PERSONAL INFORMATION AS DEFINED IN THE PROTECTION OF PERSONAL INFORMATION ACT, 2013 (POPIA). THE INFORMATION CONTAINED HEREIN WILL BE PROCESSED IN ACCORDANCE WITH THE PROVISIONS OF POPIA".



ITEM 1



ITEM 2

NOTES
1. THE FOLLOWING PERMANENT MARKINGS MUST APPEAR ON THIS ARTICLE:
   (a) TRANSNET LOGO.
   (b) MANUFACTURER'S IDENTIFICATION.
   (c) DATED BATCH NUMBER.
   (d) WIRE SIZE.
   (e) TORQUE = 9Nm.
2. DIMENSION "Y" SHOULD NOT INTERFERE WITH THE CLAMPING OF THE DROPPER CLIP.

TABLE			
DIMENSIONS	"X"	'Y"	"Z"
107mm²	4,3	1,9	9,5
161mm²	6,5	2,4	13,5

ITEM NO.	DESCRIPTION	QTY	STORES ITEM NO.	DRAWING NO.
2	HALF DROPPER CLIP WITH THREAD.	1	-	-
1	HALF DROPPER CLIP WITHOUT THREAD.	1	-	-

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN ± 0,2 ANG ± 0,5 ITEM NO : -
MATERIAL : TIN BRASS

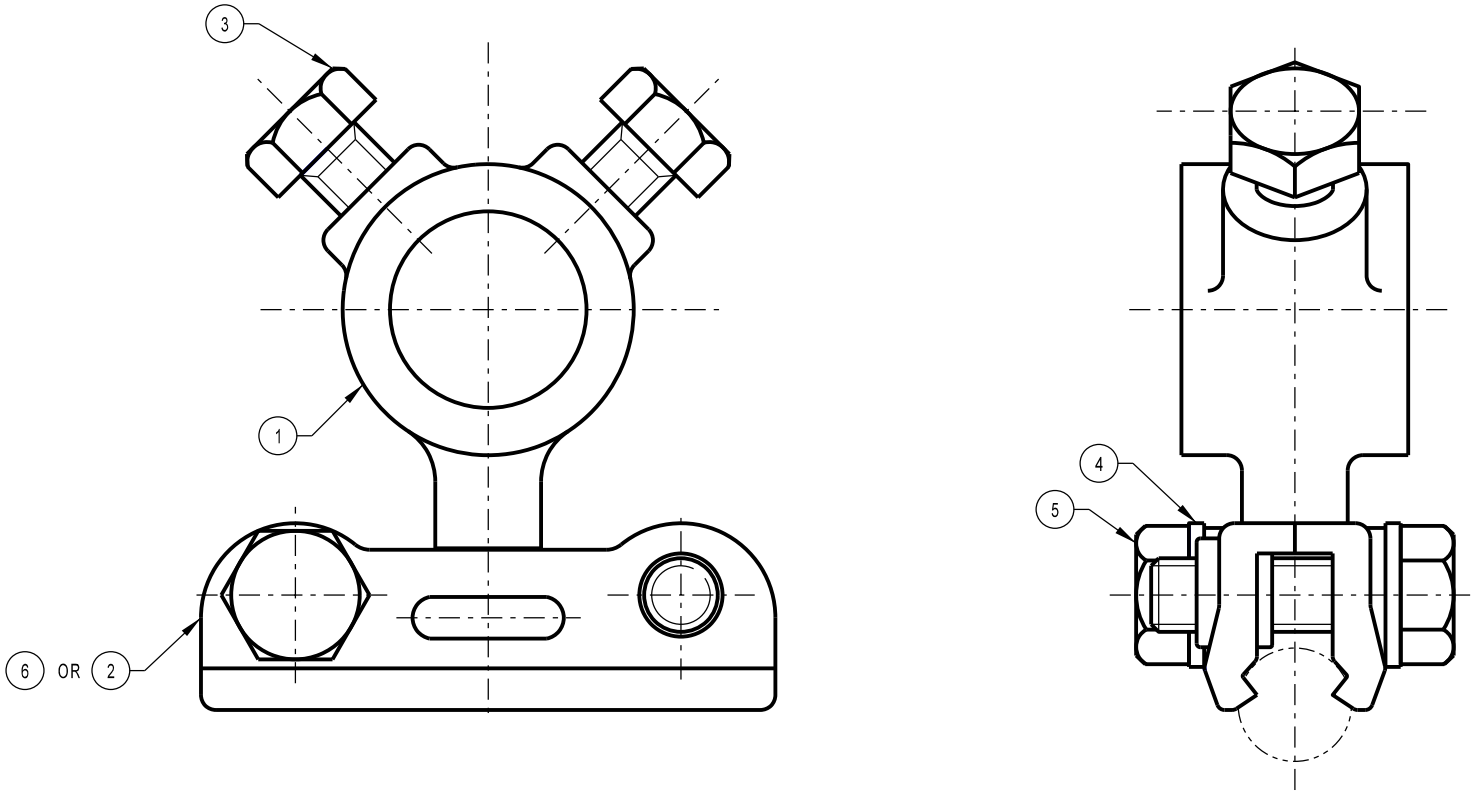
DRAWN : D HATTINGH CHECKED : D HATTINGH

COMPONENTS OF 107mm² / 161mm² TIN BRASS DROPPER CLIP

TRANSNET freight rail

CEE-TND-0022 SHT 2

VERSION 8 A4



NOTE:
SUPPLY COMPLETE ASSEMBLY WITH STEADY ARM FITTING, SWIVEL CLAMP AND CORRECT BOLTS, WASHERS AND NUTS.

STORES ITEM NO	APPLICATION	CONTACT WIRE
-	COALLINK	161mm²
-	COALLINK	107mm²
54000690	GENERAL	161mm²
-	GENERAL	107mm²

ITEM NO	DESCRIPTION	QTY	STORES ITEM NO	DRAWING NO
6	CHEEK, 107mm² CU CONTACT WIRE SWIVEL CLAMP	2	54028819	BBH3656 Sht 4
5	MACHINE SCREW, STAINLESS STEEL TO SPEC. AISI GR 304, HEX HEAD, M10 X 35 LONG	2	-	-
4	LOCK WASHER, STAINLESS STEEL TO SPEC. AISI GR 304, INTERNALLY TOOTHED, M10	2	-	-
3	MACHINE SCREW, STAINLESS STEEL TO SPEC. AISI GR 304, HEX HEAD, M10 X 20 LONG	2	-	-
2	CHEEK, 161mm² CU. CONTACT WIRE SWIVEL CLAMP	2	54033583	BBH3656 Sht 2
1	SWIVEL FITTING FOR STEADY ARM	1	-	CEE-TND-0001

DIMENSIONS : mm SCALE : 1 : 1
TOLERANCE : LIN± - ANG± - ITEM NO: -
MATERIAL : -
VERSION INFO : SWIVEL CLAMP DRAWING NUMBERS AND ITEM NO. ADDED.

08/10/2020
APPROVED: W SCHOEMAN

08/10/2020
AUTHORISED: S SMIT

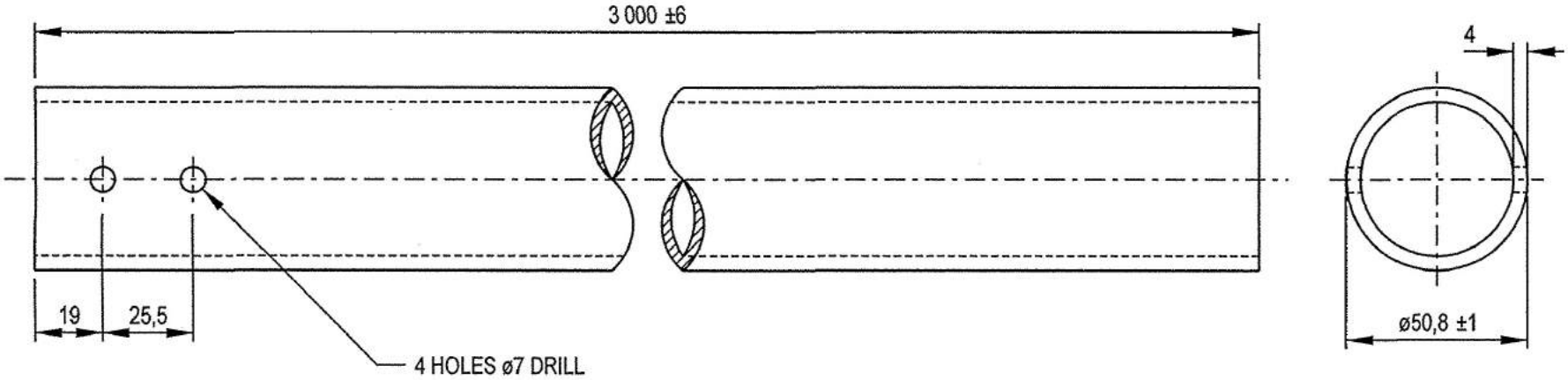
SWIVEL TYPE CONTACT WIRE CLAMP ASSEMBLY

161mm² or 107mm² Cu CONTACT WIRE STEADY ARM

TRANSNET freight rail

CEE-TND-0035
AMENDMENT 4
A4

DO REF: CDO/ E0037 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH



FINISH
ZINC COAT TO SPEC SANS 121

AMENDMENTS		
NO	NAME	DATE
2	J v Dyk	2003/02/18

REVISED, RENUMBERED AND REDRAWN.
DRG NO WAS CEE-TMHH-16
DO REF: CDO/2354

3		19/05/05

PIPE DIA. WAS ø48,7/47,9 AND LENGTH WAS 3 050.
ECP REF: BBB8668
DO REF: CDO/4179

STORES ITEM NO
54/1407

DIMENSIONSmm
SCALE: 1:2

A4

MATERIAL:METAL TUBE, STEEL TO SPEC SANS 657 - 1		
DO REF: J71/228	GEN TOL: LIN ± 0,5	ANG ± -
DRN: J V S	CKD: E L S	DATE: 56-10-16
ENG: E P A	W LEHMAN	for CHIEF ENG

CENTRAL DRAWING OFFICE SPOORNET

PUSH- PULL- OFF TUBE

DRAWING NO CEE-TND - 38

SHEET - OF -

ORIGINAL FRAME SIZE · OORSPRONKLIKE RAAMGROOTTE 390 x 267

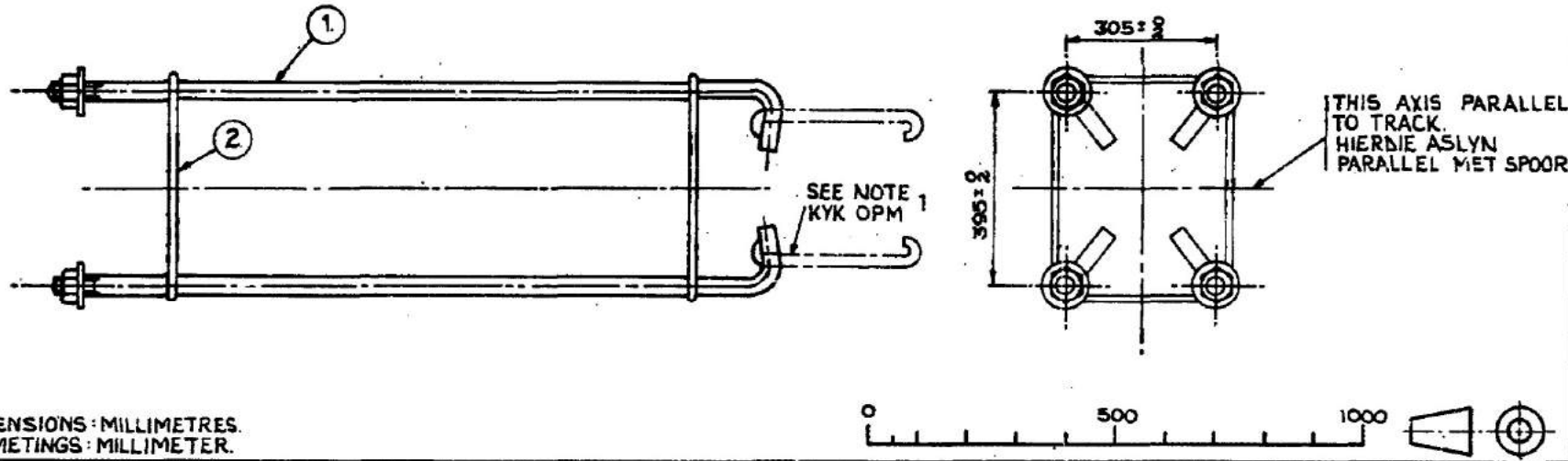
ITEM	DESCRIPTION ~ BESKRYWING	QTY. HVLD.	STORES MAGASYN NO.	DRG. TEK. NO. CEE-
1.	BOLT, FOUNDATION. BOUT, FONDAMENT.	4	———	TQ-50
2.	RING, RETAINING. RING, KEER-.	2	———	TQ-48

AMENDMENTS WYSIGINGS		
NO.	NAME NAAM	DATE DATUM
9.	B. Stewart	81-07-21

REDRAWN. ASSOCIATED DRG. NO'S. CHANGED.
OORGETEKEN. VERWANTE TEK. NO'S. VERANDER.
D.O.REF T.K.VERW. TI/81/26

NOTES/OPMERKINGS

1. BIND EXTENSION PIECES (CEE-TQ-30) ONTO FOUNDATION BOLTS WHEN REQUIRED, TO BRING REINFORCEMENT WITHIN 300mm OF BOTTOM OF FOUNDATION HOLE.
   BIND VERLENGINGSTUKKE AAN FONDAMENTBOUTE VAS WANNEER VEREIS, OM VERSTERKING BINNE 300mm VAN BODEM VAN FONDAMENTGAT TE BRING.
2. COAT THREADS WITH ANTI-CORROSIVE PASTE TO SPEC BEDEK SKROEFDRAAD MET KORROSIEWERENDE PASTA VOLG. SPES. CEE-T-P4A-9. STORES/MAGASYN ITEM NO. 9/21545.
3. FOR METHOD OF ATTACHING ITEM 2 TO ITEM 1 SEE DRG. VIR METODE OM ITEM 2 AAN ITEM 1 VAS TE HEG KYK TEK. CEE-TQ-41



DIMENSIONS: MILLIMETRES.
AFMETINGS: MILLIMETER.

CEE-TQ-17
CEE-TW-69
CEE-TW-124
CEE-TMB-31
CEE-TMB-67

ASSOCIATED DRG. VERWANTE TEK.

DRN. GET. A. van EMMENIS	GEN. TOLERANCES: LIN ± 5 ALG. TOLERANSIES: ANG/HOEK. ———	
TRCD. NGT. A. van EMMENIS	D.O.REF. TK-V-PW J72/96	ENG. ING.
CKD. NGS. J.A. BOTHMA	DATE DATUM 73-8-24.	F. PIENAAR for/ns

CHIEF ELECTRICAL ENGINEER S A R
ELEKTRIESE HOOFINGENIEUR S A S JOHANNESBURG.

A3
A4

4 x M36 FOUNDATION BOLT GROUP
FOR 203 x 152 I-MASTS AND 206 x 204 UNIVERSAL COLUMNS.

4 x M36 FONDAMENTBOUTGROEP
VIR 203 x 152 I-MASTE EN 206 x 204 UNIVERSELE KOLOMME.

MODULUS ITEM NO.

DRAWING TEKENING NO. CEE-
TQ-25

ORIGINAL FRAME SIZE / ORSPRONKLIKE RAAMGROOTTE	554 x 380.

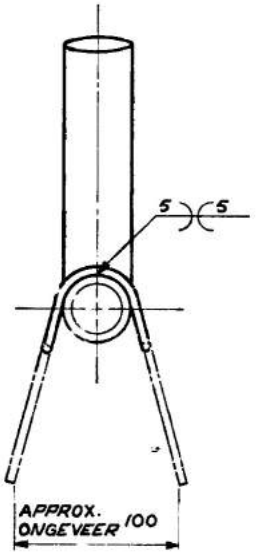
ITEM	DESCRIPTION / BESKRYWING	QTY HVLD	STORES MAGASYN NO.	DRG. TEK. NO. CEE-
1	STEEL, ROUND / STAAL, ROND ϕ36 TO VOLG. BS 4360 GRADE / GRAAD 43A (FOR LENGTH SEE TABLE. / VIR LENGTE KYK TABEL.)	1.	———	———
2	WIRE, STEEL / DRAAD, STAAL ϕ4mm x 430L.	2.	———	———
3	NUT, STEEL, ROUND, HEX. / MOER, STAAL, ROND, SESK. M36. (GALVANISED TO SPEC. / GEGALVANISEERD VOLG. SPES. SABS 763.)	1	(M)1/32921	———
4	WASHER, STEEL, ROUND. / WASTER, STAAL, ROND. M36. (GALVANISED TO SPEC. / GEGALVANISEERD VOLG. SPES. SABS 763.)	1	(M)1/33700	———

AMENDMENTS. / WYSIGINGS.		
NO.	NAME. / NAAM.	DATE. / DATUM.
1.	J. SWIEGERS	82-01-29.
ITEM 3 & 4: REVISED / HERSIEN. DO. REF. / TK-VERW. T2/82/5		

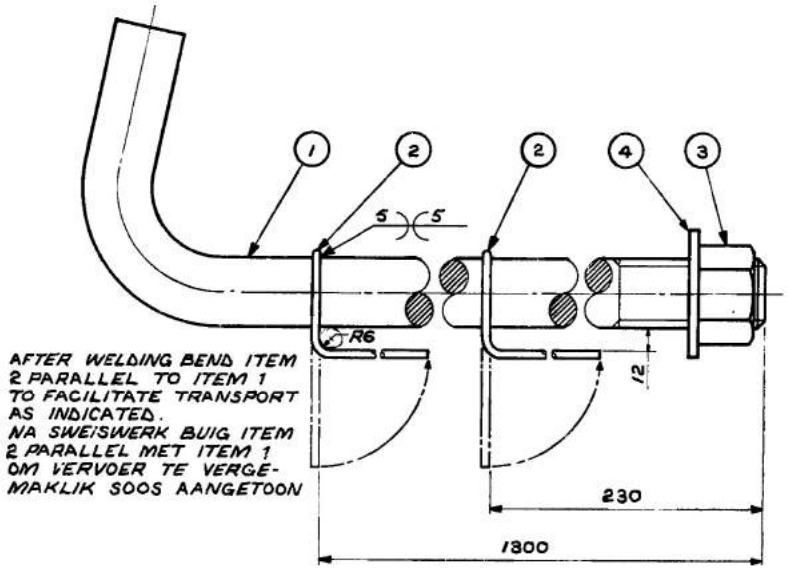
TYPE OF FOUNDATION HOLE / TIPE FONDAMENTGAT	A
ALL HOLES EXCEPT THOSE IN ROCK. / ALLE GATE BEHALWE DIE IN KLIP.	1750
HOLES IN ROCK. / GATE IN KLIP.	1450
A FRAME TENSION LEG. / RAAM SPANNINGSBEEN.	1750
A FRAME COMPRESSION LEG. / RAAM KOMRESSIEBEEN.	800

NOTE / OPMERKING.

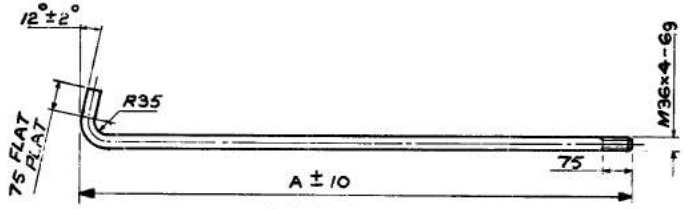
COAT THREADS WITH ANTI-CORROSIVE PASTE TO SPEC: CEE-T-P4A-9 STORES ITEM NO. (M) 9/21545.
BEDEK SKROEFDRAAD MET KORROSIEWERENDE PASTA VOLG. SPES: CEE-T-P4A-9 MAGASYNITEM NO. (M) 9/21545.



VIEW WITH NUT AND WASHER OMITTED.
AANSIG MET MOER EN WASTER WEGGELAAT.



AFTER WELDING BEND ITEM 2 PARALLEL TO ITEM 1 TO FACILITATE TRANSPORT AS INDICATED.
NA SWEISWERK BUIG ITEM 2 PARALLEL MET ITEM 1 OM VERVOER TE VERGEMAKLIK SOOS AANGETOON



ITEM 1

0 500 1000
100 200

DIMENSIONS: MILLIMETRES. / AFMETINGS: MILLIMETER.
S.A. TRANSPORT SERVICES. / S.A. VERVOERDIENSTE.

DRN. / GET. M. VERMEULEN	GEN. TOLERANCES: LIN. ± 5 / ALG. TOLERANSIES: ANG. / HOEK. ———	
TRCD. / NST. M. VERMEULEN	D.O. REF. / T.K. VERW. T2/80/15	ENG. / IR.
CKD. / NGS. B. Stewart.	DATE. / DATUM. 80-11-03	
CHIEF ELECTRICAL ENGINEER / ELEKTRIESE HOOFINGENIEUR	JOHANNESBURG.	Per pro.

BOLT, FOUNDATION M36. WITH SECURING WIRE.
BOUT-, FONDAMENT M36. MET VASHEGTINGSDRAAD.

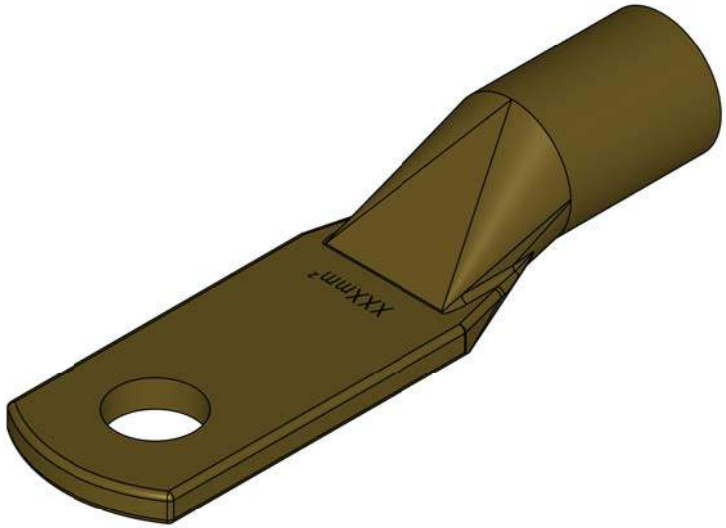
CEE-TQ-20, 25, 28, 29
CEE-TQ-34, 36
ASSY. DRG. / SAMEST. TEK.

MODULUS / ITEM NO.

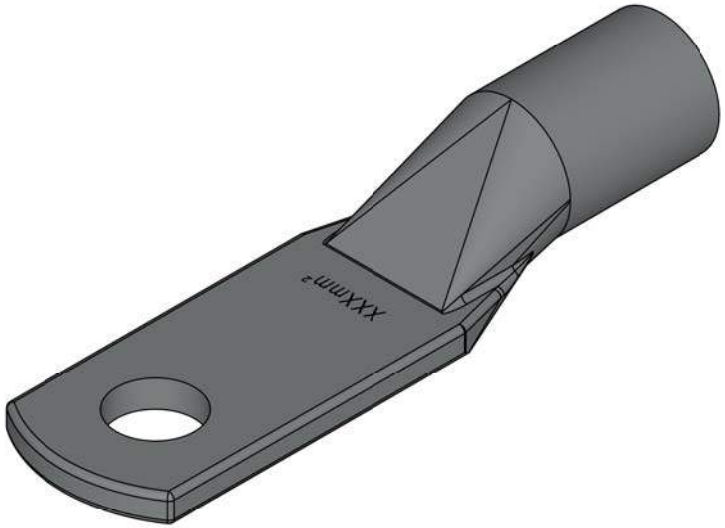
PREVIOUS ITEM NO. / VORIGE ITEM NO.

DRAWING NO. / TEKENING NO. CEE-TQ-50

A2
A3



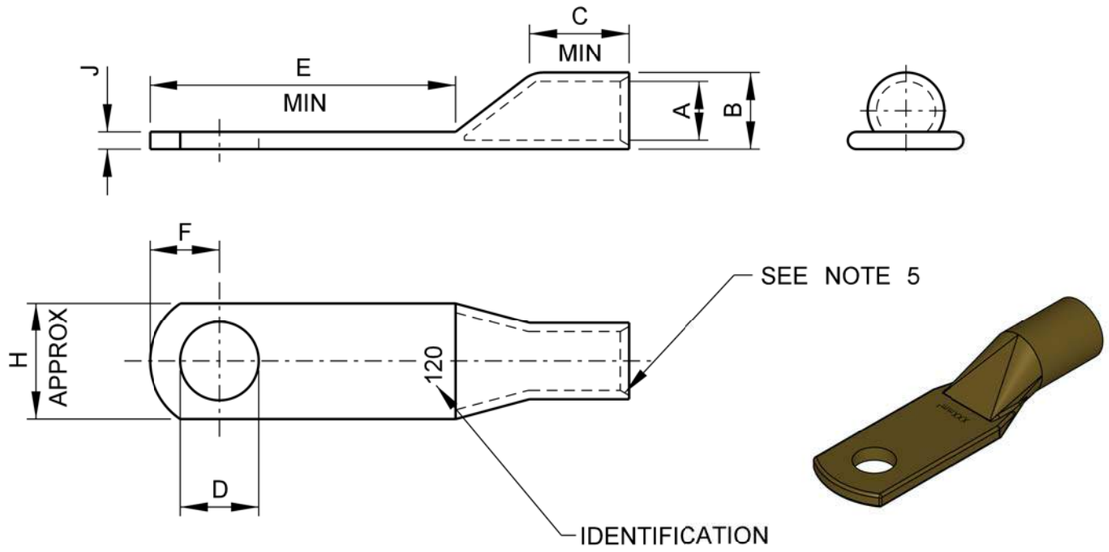
FOR TINNED COPPER LUGS
SEE CEE-TU-0136 SHT. 1



FOR ALUMINIUM LUGS
SEE CEE-TU-0136 SHT. 2

DIMENSIONS : mm SCALE : NTS TOLERANCE : LIN± 0,5 ANG±1° ITEM NO : - MATERIAL : - VERSION INFO : NOTE 5 ADDED ON SHEET 1. NOTE 4 ADDED ON SHEET 2.	+ 28/02/2024 APPROVED: W SCHOEMAN	+ TGovender AUTHORISED: T GOVENDER	TERMINAL LUG FOR BONDING CABLE	TRANSNET freight rail CEE-TU-0136 VERSION 10 A4

DO REF: CDO/ E0471 ECP REF: - DRAWN: D HATTINGH DESIGNED: - CHECKED: D HATTINGH



TOLERANCES		
DIM A	SIZES UP TO 7mm	0 -0,15
	SIZES OVER 7mm	0 -0,2
DIM B	SIZES UP TO 10mm	+0,15 0
	SIZES OVER 10mm	+0,2 0
DIM D	SIZES UP TO 9mm	È0,3
	SIZES OVER 9mm	0 -0,5
DIM F	SIZES UP TO 8mm	È0,5
	SIZES OVER 8mm	È1,0
DIM J	SIZES UP TO 5mm	È0,25
	SIZES OVER 5mm	È0,5

STORES ITEM NO	NORMAL LUG SIZE mm²	STUD Ø	DIMENSIONS								IDENTIFICATION
			A	B	C	D	E	F	H	J	
54017082	50	14,5	9,56	12,45	16,2	14,5	50,0	11,0	18,9	2,8	50
54017094	70	14,5	11,28	14,71	18,1	14,5	50,0	11,0	24,0	3,1	70
54017109	95	14,5	13,5	17,15	20,3	14,5	52,5	13,5	24,2	4,0	95
54022835	100	14,5	13,8	17,7	20,3	14,5	52,5	13,5	24,2	4,0	100
54017110	120	14,5	14,72	19,22	22,6	14,5	52,5	13,5	27,0	4,45	120
54017122	150	14,5	16,42	21,46	25,3	14,5	56,5	17,5	31,0	5,10	150
54004081	160	14,5	17,0	22,0	28,0	14,5	60,0	17,5	31,0	5,10	160

NOTES
1. THE FOLLOWING PERMANENT MARKINGS MUST APEAR ON THIS ARTICLE:
   a) MANUFACTURERS IDENTIFICATION.
   b) CABLE SIZE.
2. LUG TO BE CRIMPED WITH DIES SHOWN ON DRG NO. CEE-PP-0015.
3. WHEN LUG IS FORMED, MATERIAL MUST NOT BE FRACTURED.
4. LUG TO BE THOROUGHLY ELECTRO-TINNED: INTERNALLY AND EXTERNALLY.
5. INSIDE OF LUG BARREL TO BE CHAMFERED.

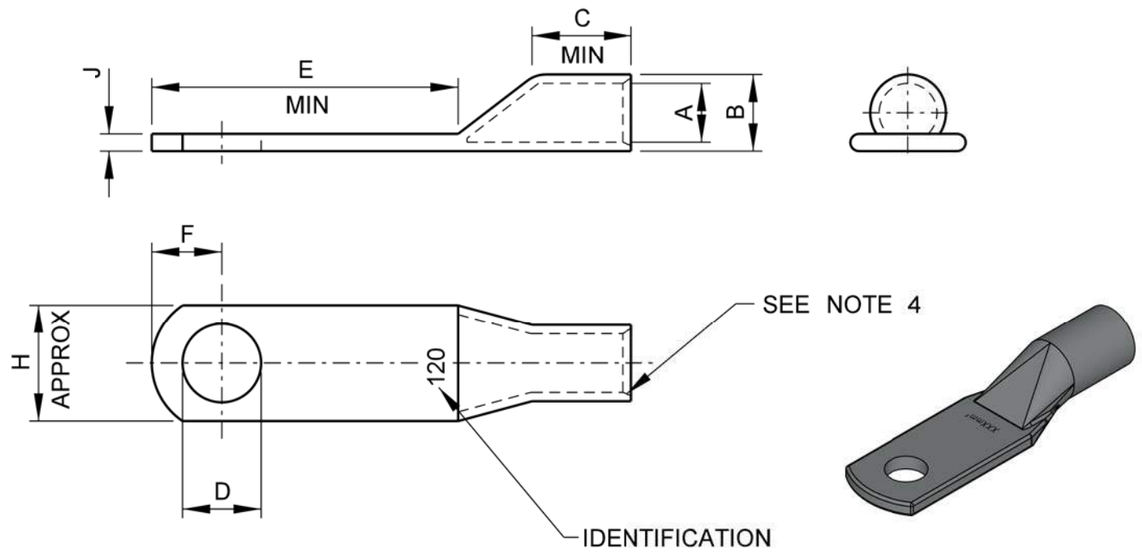
DIMENSIONS : mm SCALE : NTS
TOLERANCE : LIN± - ANG± -
MATERIAL : COPPER TO SPECIFICATION SANS 460, FULLY ANNEALED.

DRAWN : D HATTINGH CHECKED : D HATTINGH

TINNED COPPER TERMINAL LUG FOR BONDING CABLES

TRANSNET freight rail

CEE-TU-0136 SHT 1
VERSION 10 A3



TOLERANCES		
DIM A	SIZES UP TO 7mm	0 -0,15
	SIZES OVER 7mm	0 -0,2
DIM B	SIZES UP TO 10mm	+0,15 0
	SIZES OVER 10mm	+0,2 0
DIM D	SIZES UP TO 9mm	È0,3
	SIZES OVER 9mm	0 -0,5
DIM F	SIZES UP TO 8mm	È0,5
	SIZES OVER 8mm	È1,0
DIM J	SIZES UP TO 5mm	È0,25
	SIZES OVER 5mm	È0,5

STORES ITEM NO	NORMAL LUG SIZE mm²	STUD Ø	DIMENSIONS								IDENTIFICATION
			A	B	C	D	E	F	H	J	
54112445	50	14,5	9,9	14,7	16,2	14,5	50,0	11,0	18,9	4,8	50
54112446	70	14,5	11,7	17,0	18,1	14,5	50,0	11,0	24,0	5,1	70
54112447	95	14,5	13,7	19,7	20,3	14,5	52,5	13,5	24,2	6,0	95
54112448	100	14,5	14,0	20,2	20,3	14,5	52,5	13,5	24,2	6,2	100
54112449	120	14,5	15,3	22,2	22,6	14,5	52,5	13,5	27,0	6,9	120
54112450	150	14,5	17,2	24,7	25,3	14,5	56,5	17,5	31,0	7,4	150
54112451	160	14,5	19,0	27,3	28,0	14,5	60,0	17,5	31,0	8,3	160

NOTES
1. THE FOLLOWING PERMANENT MARKINGS MUST APEAR ON THIS ARTICLE:
   a) MANUFACTURERS IDENTIFICATION.
   b) CABLE SIZE.
2. LUG TO BE CRIMPED WITH DIES SHOWN ON DRG NO. CEE-PP-0015.
3. WHEN LUG IS FORMED, MATERIAL MUST NOT BE FRACTURED.
4. INSIDE OF LUG BARREL TO BE CHAMFERED.

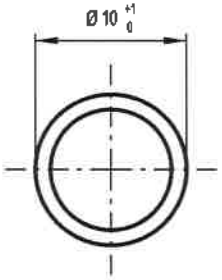
DIMENSIONS : mm SCALE : NTS
TOLERANCE : LIN± - ANG± -
MATERIAL : ALUMINIUM

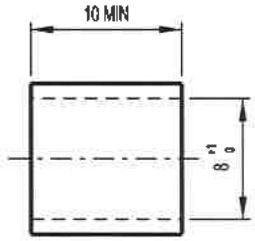
DRAWN : D HATTINGH CHECKED : D HATTINGH

ALUMINIUM TERMINAL LUG FOR BONDING CABLES

TRANSNET freight rail

CEE-TU-0136 SHT 2
VERSION 10 A3



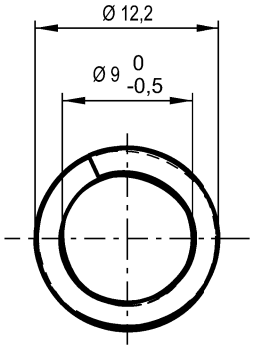


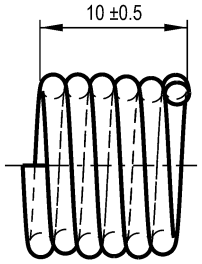
NOTE

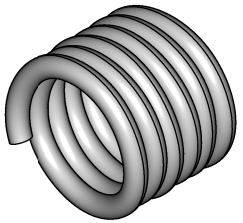
1. SEE SHEET 1 FOR AN ALTERNATIVE SPRING SECURING SLEEVE

DIMENSIONS : mm SCALE : 2 : 1 TOLERANCE : LIN± 0,5 ANG±- ITEM NO : 54002790 MATERIAL : Stainless Steel, AISI Grade 304, Ø10 OD x 10L x 1mm Thick Wall Alternatively: Copper Tube,To SANS 460 Table 2 Class 3. VERSION INFO: Sheet 1 with a spring alternative added	+ 2020/07/16 APPROVED: W SCHOEMAN	+ 2020/07/16 AUTHORISED: S SMIT	SLEEVE, DROPPER SECURING	TRANSNET freight rail CEE-TX-0079 VERSION 9 A4

DO REF: CDO/ 9541 ECP REF: - DRAWN: S. MAZIBUKO DESIGNED: - CHECKED: S. MAZIBUKO

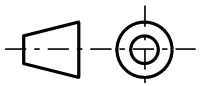






NOTE

1. THE SPRING MUST HAVE A MINIMUM OF 6.5 TURNS.



DIMENSIONS: mm SCALE: 2 : 1
TOLERANCE : LIN±- ANG± -
MATERIAL : STAINLESS STEEL WIRE, AISI GRADE 304, Ø1.6

DRAWN : S.M. MAZIBUKO CHECKED: -

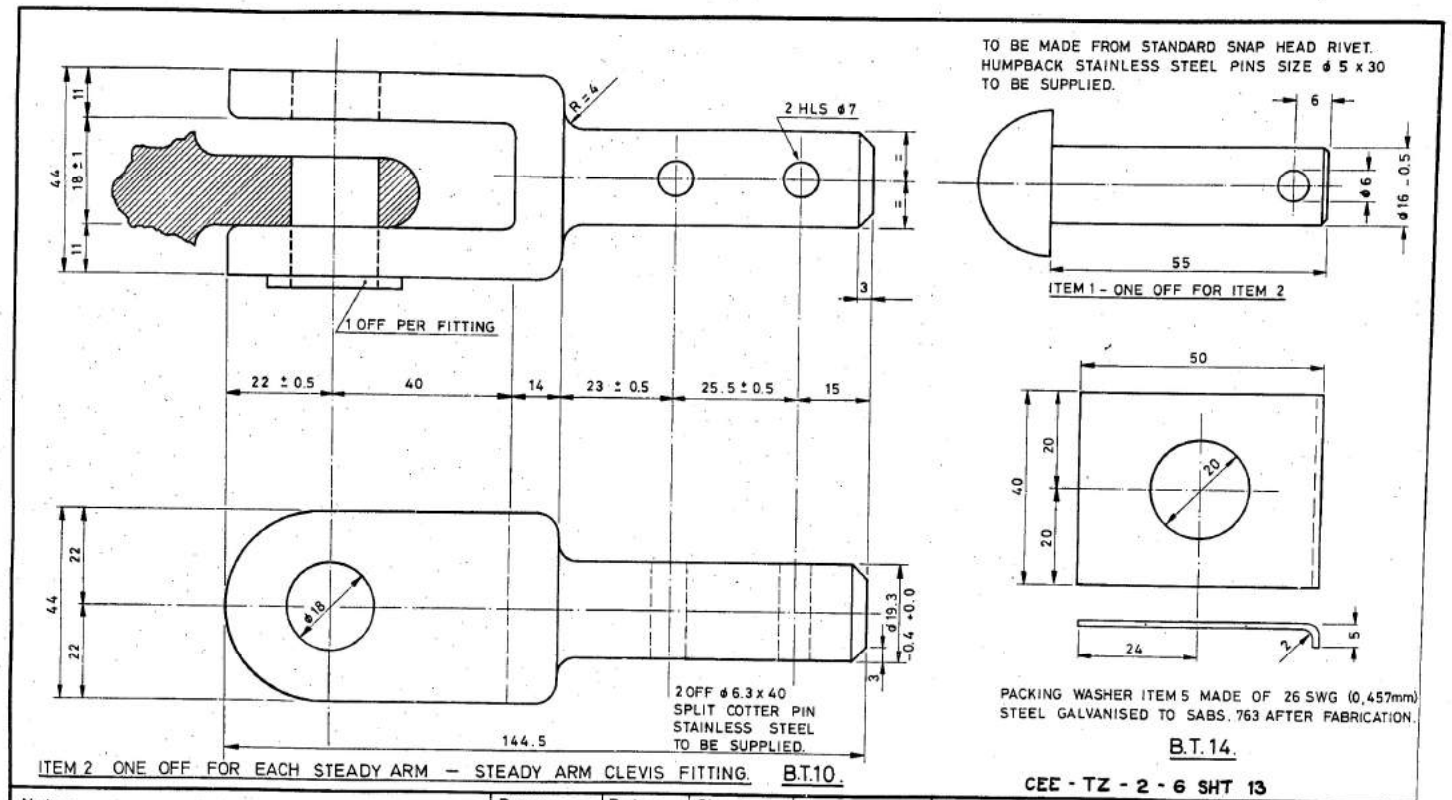
SPRING, DROPPER SECURING

TRANSNET freight rail

CEE-TX-0079 Sht 1

VERSION 9

A4



ITEM 2 ONE OFF FOR EACH STEADY ARM – STEADY ARM CLEVIS FITTING. B.T.10.

B.T.14.

CEE - TZ - 2 - 6 SHT 13

Notes:
MATERIAL: MALEABLE CAST IRON TO B.S. 309-1958 SPECIFICATION. GALVANISED TO S.A.B.S. 763.

Drawn	Date	Checked	Approved
[illegible]	22·8·77	G.H.	G.H.

Client: South African Railways
Contract No EW 347
Industrial Electrical Co. (Pty.) Ltd.

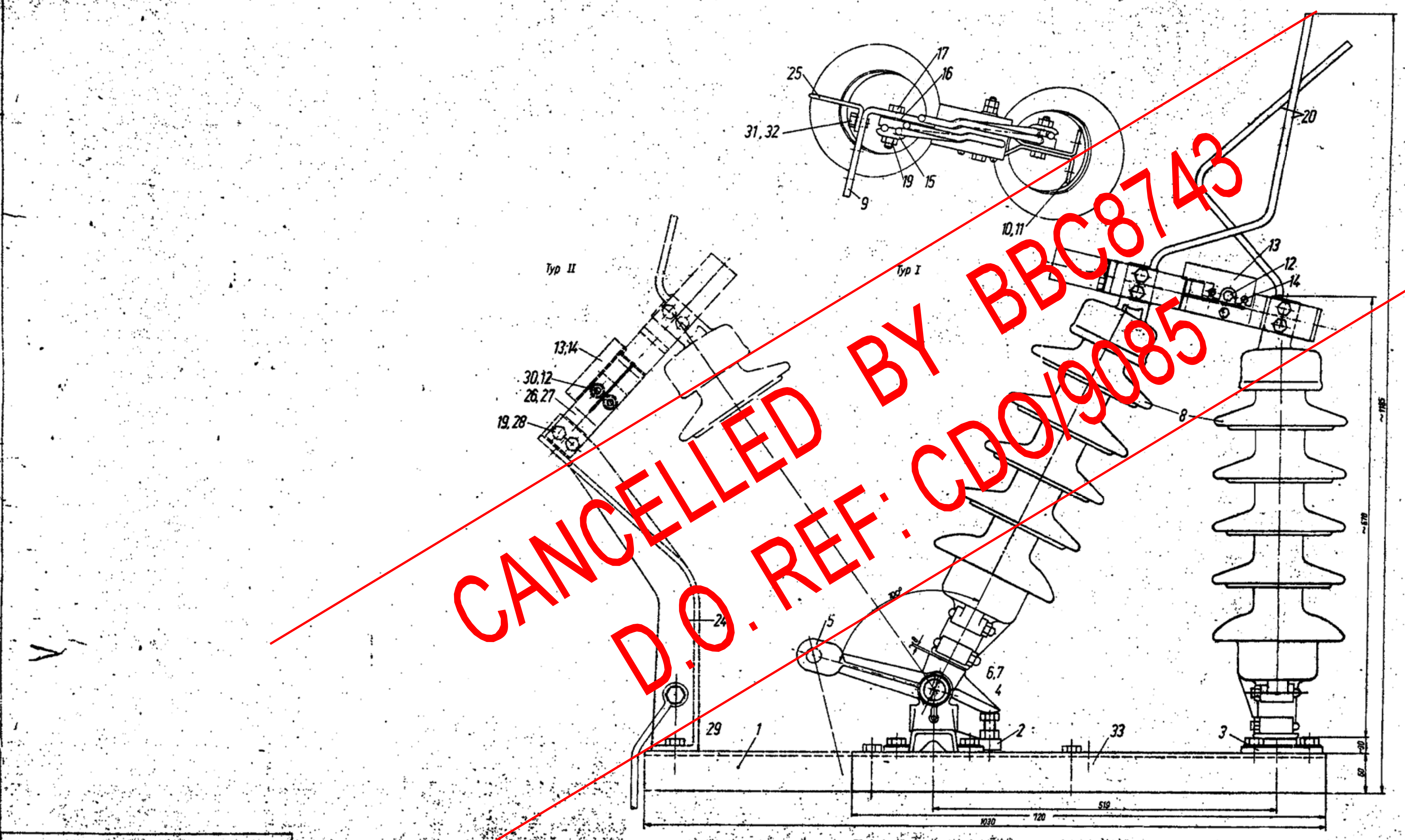
Project: Brits-Thabazimbi
25 kV - 50 Hz Electrification

Title: BT.10.+14. Details of Ferrous Fittings for Steady & Registration Arms.

BRIAN COLQUHOUN, HUGH O'DONNELL & PARTNERS
CONSULTING ENGINEERS AND
ENGINEERING MANAGEMENT CONSULTANTS
4th Floor, Total House
209 Smit str. Jhb. Tel. 724-8372

Drawing No. ~~2066/E/6/12~~ SHEET 3

QZALID W 23



Für jeden Trennschalter sind 2 annähernd gleich lange Isolatoren zu verwenden!

CANCELLED BY BBC8743
D.O. REF: CDO/9085

Qty	Qty	Description	Item	Material	Reference
–	1	Schalterh. 1 / supporting channel	33		BBC GVT 3 509 382
2	–	Zahnscheibe A12,5 / toothed lock washer	32	Bz	DIN 6797
2	–	M12×20 / M12×20	31	Cuprodur	DIN933
1	–	Kontaktfederung / ressorts / contact springs	30		BBC Ebs 090118
2	–	hexagon bolt M16×30 with nut	29		DIN 601 galvanised
2	–	hexagon bolt M12×35	28	Cuprodur	DIN 931
1	–	contact spring	27		BBC Ebs 090602 T5
1	–	contact spring	26		BBC Ebs 090602 T6
1	–	earthing contact	25		BBC Ebs 090602 T2
1	–	bracket for earthing contact	24		BBC GVT 3507 185
1	1	arching horn	20		GVT 3 509 108/1+2
6	4	hexagon nut M12	19	Cuprodur	DIN 934
			18		
4	4	hexagon bolt M12×35	17	Cuprodur	DIN 933
1	1	liner	16		BBC Ebs 090602 T7
2	2	plate	15		GVT Ebs 090812 T3
4	2	cylinder bolt A M5×8	14	Cuprodur	DIN 84
2	1	Schutzkappe / cap	13		BBC Ebs 090108
–	1	contact springs	12		BBC Ebs 09.01.14 a
1	1	contact spring	11		BBC Ebs 090602 T3
1	1	contact spring	10		BBC Ebs 090602 T4
1	1	Kontaktmesser / contact blade	9		BBC Ebs 090602 T1
2	2	Isolator komplett / isolateur / insulator	8		BBC GVT 4 809 064
1	1	Welle / axe / axle	7		BBC GVT 2509477 T1
1	1	Stellring mit Gewinde M12×20 DIN 558 / set collar	6		BBC GVT 4509 116 T2-7
1	1	Hebel für Schaltgestänge komplett / levier pour tirant de sectionneur / lever	5		BBC GVT 3509 177 T2+2
1	1	Schwenksockel / socle à articuler / swivel joint	4		
1	1	console for insulator	3		Ets N229 BBC SK 10705
1	1	bearing support	2		BBC GVT 3509 117
1	–	supporting channel	1		BBC GVT 3507 186

TRACK-SWITCH 25KV
INSULATOR CREEPAGE PATH 960mm

Trennschalter für 25 kV

CEE-TZ-9/236