TRANSNET RAIL ENGINEERING

SPECIFICATION FOR MAIN FIELD POLE AND INTERPOLE COILS FOR TRACTION MOTOR TYPE AEI 283 FOR 6E/6E1

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SUMMARY OF REVISION

First issue – DATE Document No. PD_COMP_NAT_SPEC_807

The following revisions have been made in this version:

Change	Description

Document Control

Distribution List Distribute to Configuration Offices at the following centers" "Configuration Offices to discuss with the Business Manager, Quality personnel, Lean personnel in the following businesses to distribute the document to all relevant personnel "	List Centers RM KDS, RM DBN, RM SLR List Businesses Nat Lean, Nat Quality, RM
Document Availability	http://twk intra2/intrj/
Related Policy Documents	
Supporting Procedure	

SUMMARY OF REVISON

1.0 SCOPE

1.1 This specification covers the minimum requirements of Transnet Rail Engineering for the manufacture, testing and delivery of main pole and interpole coils for 6E/6E1 electric locomotives traction motors, type AEI 28, operating at 3KV (nominal voltage) with two motors in series.

2.0 REFERENCES

2.1 The following applications are referred to herein

2.1.1 South African bureau of standards SABS 804: 1970 Unwrought pitch copper.

2.1.2 British Standard institution

BS EN 60084: 2004 – Method of determining the thermal classification of electrical insulation.

2.2 The following drawings are referred to herein:

Drg No: RT-BCD-29, coil, insulation details, main field, traction motor type 283AY
Drg No: RT-BCD-28, coil, insulation details, commutating pole, traction motor type 283AY.

3.0 APPENDICES

The following appendices form an intergral part of this specification.

3.1 Appendix 1: Main Field Coil, 6E/6E1 Electric Locomotives, Details of main field coil insulation system and relevant drawings.

3.2 Appendix 2: Compole coil, 6E/6E1 Electric Locomotives, Details of compole coil insulation system and relevant drawings.

4.0 SERVICE CONDITIONS

4.1 The main pole and interpole coils shall be designed for operation under the following conditions:

4.1.1 Environmental conditions

Altitude	: 0 to 1800m above sea level
Temperature	: Minus 5°C to plus 40° C
Relative humidity	: Salt laden fog conditions
Lightning conditions	: Severe

4.1.2 The traction motor environment is heavily polluted with steel brake block dust, carbon dust and sand dust.

5.0 ADDITIONAL REQUIREMENTS

5.1 The tenderer shall furnish full details, at the time of tendering of their experience in respect of the manufacturing of main pole and interpole coils for traction motors operating at 3000V

5.2 The main pole and interpole coils shall be in accordance to the relevant drawing numbers, RT-BCD-29 and RT-BCD-28.

5.3 After winding the sets of main pole and interpole coils, Assembled coils will be sealed by Vacuum pressure impregnation process using Epoxy Novolac resin to meet class 200 with spec number: PD_COMP_NAT_SPEC_787.

5.4 All traction motor main fields and interpole coils shall be VPI processed on pole pieces.

5.4.1 The tendere shall simulate the frame to VPI main field and interpole coils

5.4.2 Main field and interpole coils shall be clamped to maintain the outside dimensions of the coil.

5.5 The tenderer shall submit manufactures specifications for all insulation materials used, as well as the type of resin used for bonding.

5.6 Material offered in appendices shall be supplied in terms of this specification and no changes or substitutes will be allowed unless fully motivated and with the written concert to Principal Product Engineer, Rotating Machines, Transnet rail Engineering.

5.7 Acceptance by Principal Product Engineer, Rotating Machines, Transnet Rail Engineering of the material offered in these appendices, in no way relieves the tendere of his obligation to fulfil his statement of compliance with this specification.

5.8 Principal Product Engineer, Rotating Machines reserves the right to subject main pole and interpole coils offered to test/inspection in order to check compliance with the relevant clause of the specification and or quality claimed by the tendere prior to adjudication or at any stage during manufacture.

5.9 Each coil wounded shall be consolidated to bond the conductor with interturn insulation and to ensure that coil turns are aligned with interturn insulation and the internal dimensions of the coil are maintained.

6.0 CONDUCTORS

6.1 The conductors of the main pole and interpole coils shall be made of bright, annealed electrolytic, tough pitch, high conductivity, and copper strip in accordance with specification: PD_COMP_NAT_SPEC_804.

7.0 INSULATION

7.1 All insulation used shall comply with the requirements of BS EN 60085 for class H, Must be compatible with VPI resins quoted in clause 5.3 of this document and shall be in accordance with the minimum requirements indicated in appendix 1 or 2 of this document.

7.2 The insulation of the main pole and interpole coils shall be suitable to be formed under pressure using the full thickness of the insulation specified, so that it complies with finished dimensions indicated on the relevant drawings. The coils shall retain these dimensions for a storage period of up to 24 months.

7.3 It should be noted that main pole and interpole would be stored indoors.

8.0 TEST

8.1 The tendere shall subject the main pole and interpole coils to electrical test in order to test the integrity of the inter - turn insulation and ground wall insulation

8.2 Each coil manufactured shall withstand the test voltages as per detailed on these specifications, Dielectric testing: PD_ PERM_NAT_PRAC_001, Surge testing: PD_PERM_NAT_PRAC_002 and Resistance standard testing: RT-TE-SPC-0256.

8.3 Test certificate reflecting results of the test detailed above, signed by the manufacture shall be submitted for each set of main pole and interpole coils.

8.4 If the coil insulation fails the test, it shall be repaired and re-tested.
8.5 All mechanical test shall be as per drawing supplied, pole piece to flush with the coil.

9.0 INSPECTION

9.1 Transnet Rail Engineering reserves the right to inspect the premises to validate the manufactures capability.

9.2 Transnet Rail Engineering representative shall have the right to inspect the main pole and interpole coils at any stage of manufacture and to be present at any test carried out at the manufactures premises.

9.2.1 The contractor must advise Transnet rail engineering when production of the first trial commences and when it is completed.

9.3 If required by Transnet rail engineering, the contractor shall first supply one complete pre-production main pole and interpole coils for testing, examination of the insulation and assessment of the methods of manufacture, before proceeding with the remainder of the order.

9.3.1 The contractor will be required to supply one complete set of pre-production field and Interpole coils for installation in a traction motor for the checking of dimensions and fit, before proceeding with the remainder of the order.

10.0 MARKING

10.1 Each main pole and interpole coil shall be marked with a unique number:

Manufactures name or symbol
Date of manufacture (month & year)
Expiry date of coil (month & year)
Serial number

11.0 PACKING

11.1 The main pole and interpole coils shall be packed in sets, such that:

11.1.1 They shall not sustain damage during handling and transport.

11.1.2 They shall not be affected by moisture; a dehydrating agent shall be included in the packing.

11.2 A copy of the test certificate as well as a copy of the inspection certificate shall accompany the coils.

11.3 The container for each main pole and interpole coil set shall be marked with similar information to that of the coils contained therein and shall also include the Transnet rail engineering item number of the main pole and interpole coils.

11.4 The container must be so designed to enable handling with a forklift. The container must be strong enough to protect the coils during handling process.

12.0 APPENDIX 1 MAIN POLE FIELD COIL

DETAILS OF MOTOR, MAIN POLE FIELD COIL INSULATION SYSTEM AND RELEVANT DRAWINGS.

12.1 6E/6E1 Electric Locomotives, AEI 283

12.1.1 Details of main pole field coil insulation system and relevant drawings:
Drg No: RT-BCD-29, coil, insulation details, main field, traction motor type 283AY
Drg No: RT-BCD-27, Main field coil and pole piece assembly
Drg No: RSE-BCA-68, Main pole piece build up
Drg No: RSE-BCA-60, Main pole piece laminations
Drg No: RSE-BCa-65, Main pole piece end plate

Insulation material system: PD_PERM_NAT_014 with item number: 085807266.

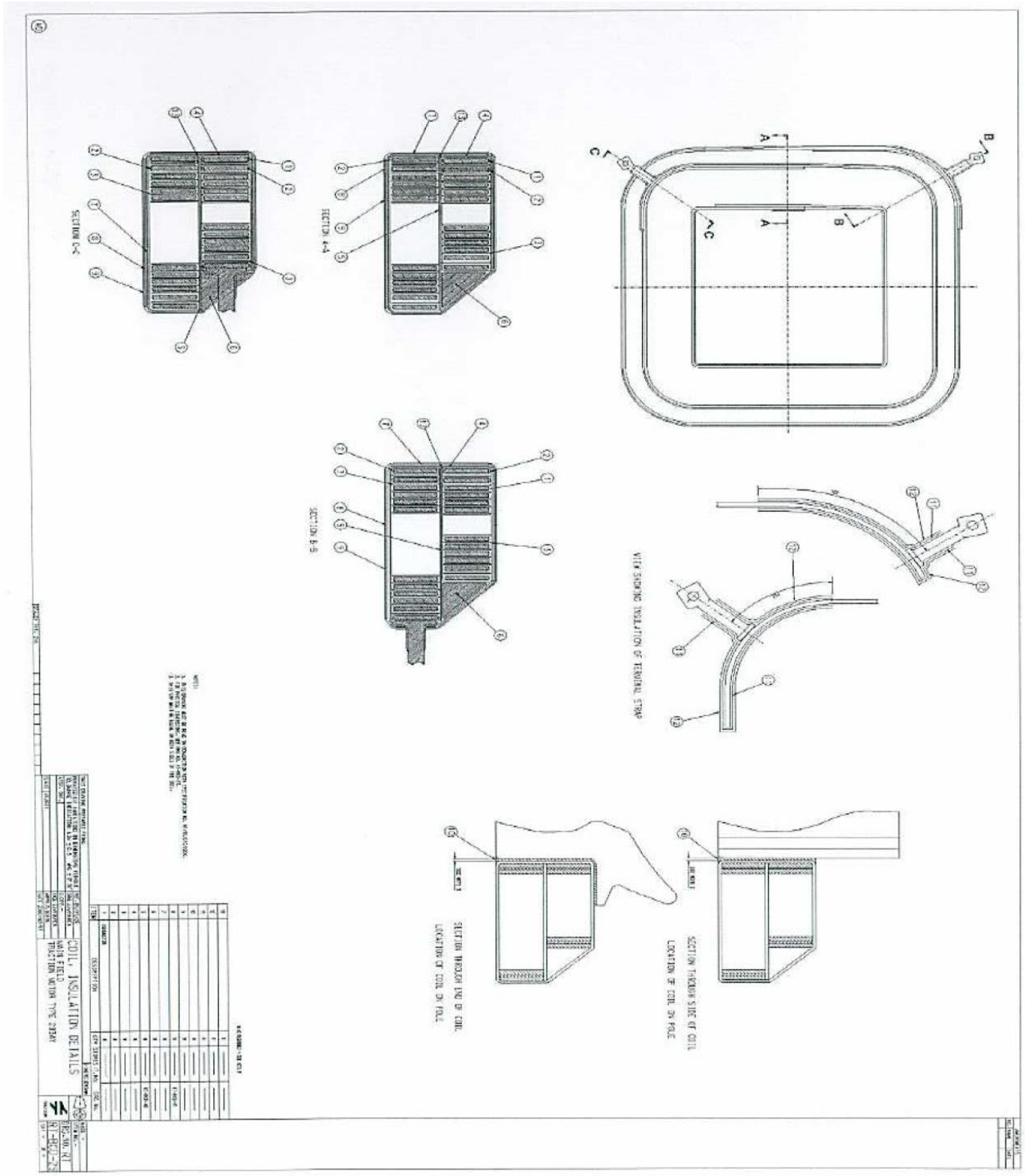
Winding of main field coil, 6E/6E1 AEI 283 AY			
Item No	Item description		Minimum requirements/ process description
1	Interturn insulation	Material	Nomex 410 “B” stage 0.05mm
		Method of application	Tape two ½ lap layers in series with the conductor during coil winding process
2	Consolidation process	Process	Bonding of interturn insulation with copper conductor

		Method of application	Align the coil flat on a consolidation table, exert pressure vertical and horizontal directly to the coil, and apply current by means of DC generator to heat up the coil
3	Separator/sandwich insulation	material	Nomex 414, calendared, 0.38mm
		Method of application	Fit the insulation between two pan cakes
4	Brazing of lead terminal lugs and series joints	Material	Silver solder with a silver content of 40 to 50%
		Method of application	Fill in the joints between two surfaces to be brazed
5	Tape leads terminals	Material	Low bond glass baked mica paper 0.15mm
		Method of application	Tape leads from lead to terminal strap, 1 layer half lap
6	Filler	Material	Non slum putty
		Method of application	Apply putty to gaps ensuring a smooth uniform surface between pancakes.
7	Main wall insulation	Material	Low bonded glass mica tape 0.15mm
		Method of application	Tape three layers ½ lap
8	Felt washer	Material	Pure aromatic polymide fibre fabric 3mm nomex felt
9		Method of application	Position flush with surface of coil, apply to the frame side of the coil and tape in position with one ½ lap layer of glass tape
10	Outer wall	Material	Treated herringbone

	insulation		glass tape 0.15mm
		Method of application	Tape one layer ½ lap
11	Sewn	Process	Needle & thread
		Method of application	Finish of final tape with needle & thread

Assembling of main field coil, AEI 283 AY			
Item No	Item description		Minimum requirements/ process description
12	Pole piece insulation	Material	Calendared aramid Nomex 410 “B” stage 0.25mm
		Method of application	Wrap pole piece before fitting the coil
13	Coil support	Material	Delmat strip 0.8mm
		Method of application	Placed on the pole piece edge to protect/support the coil
14	Fillers	Material	Non slum Putty
		Method of application	Apply putty to gaps ensuring a smooth uniform between pole piece and the coil. Or with a 2mm poromat
15	Release agent	Material	Teflon coated sheet bigger that the coil and the pole piece
		Method of application	Used as release agent, on coil base during VPI processing on the steel jig/plates

DRAWING NUMBER: RT-BCD-29



13.0 APPENDIX 2 INTERPOLE COIL

DETAILS OF MOTOR, COMMUTATING COILS INSULATION SYSTEM AND RELEVANT DRAWINGS.

13.1 6E/6E1 Electric Locomotives, AEI 283

13.1.2 Details of Compole coil insulation system and relevant drawings:

Drg No: RT-BCD-28, coil, insulation details, commutating pole, traction motor type 283AY
Drg No: RT-BCD-26, Compole and pole assembly
Drg No: RT-BCD-37, Compole piece
Drg No: RT-BCD-34, Pole laminations
Drg No: RT-BCD-36, Spacer block
Drg no: RT-BCD-32, End plate
Drg No: RT-BCD-35, Rivets

Insulation material system: PD_PERM_NAT_015 with item number: 085807265.

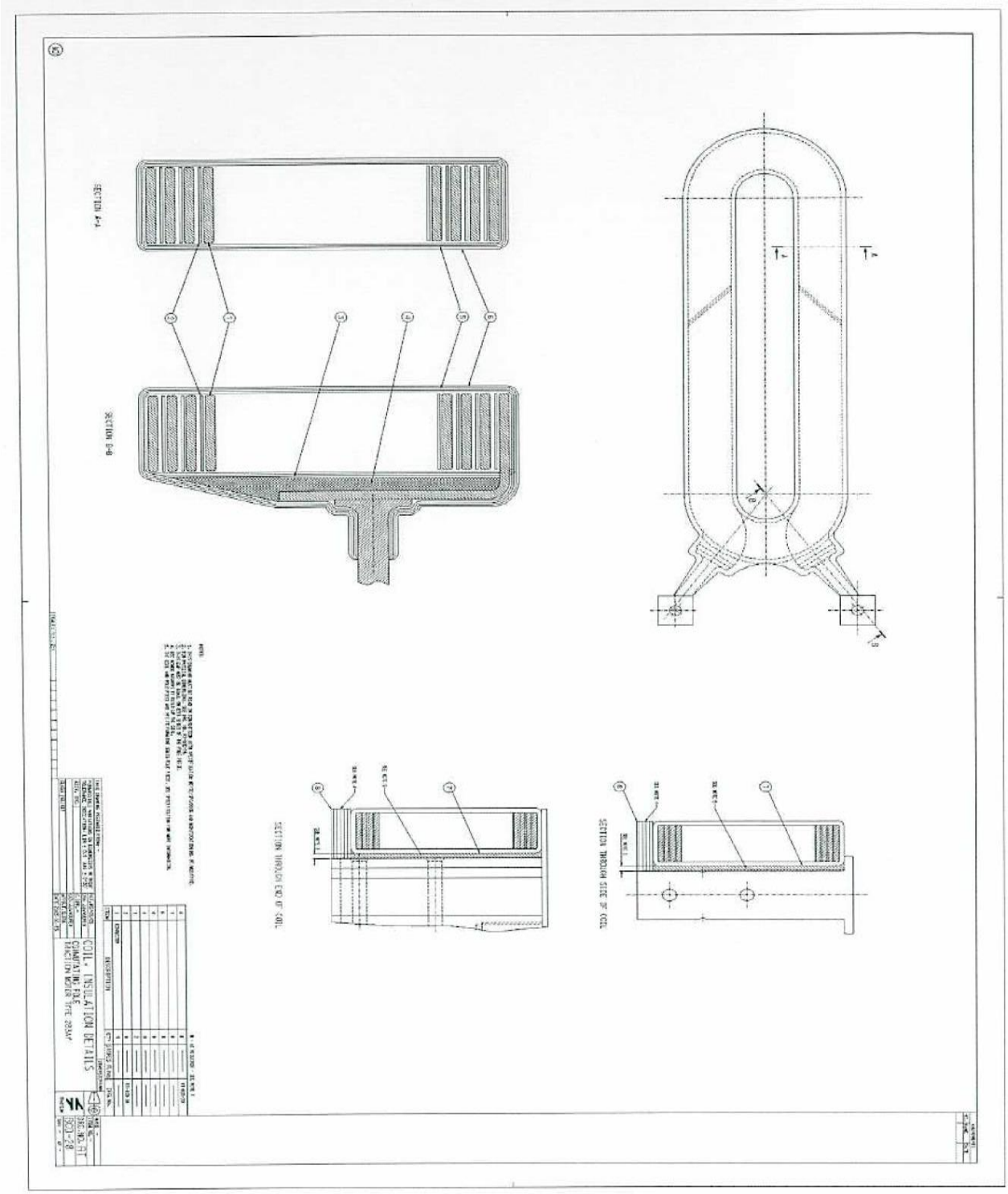
Winding of interpole coil, 6E/6E1			
Item No	Item description		Minimum requirements/ process description
1	Brazing of lead terminal lugs	Material	Silver solder with a silver content of 40 to 50%
		Method of application	Fill in the joints between two surfaces to be brazed
2	Interturn insulation	Material	Nomex 411 “B” stage 0.13mm
		Method of application	Insulate between the coil turns with two ½ lap layers overlap one piece when inserted so that the ends are staggered.
3	Consolidation process	Process	Bonding of interturn insulation with copper conductor
		Method of application	Align the coil with interturn insulation in a consolidation table,

			and exert pressure vertical to the coil using a V- block. Apply current by means of DC generator to heat up the coil
4	Filler	Material	Non slum putty
		Method of application	Apply putty under and around terminal stud ensuring a smooth uniform finish.
5	Tape main wall insulation	Material	Low bonded glass mica tape 0.15mm
		Method of application	Tape three ½ lap layers. Scarving to be done if necessary
6	Outer wall insulation	Material	Treated herringbone glass tape 0.15mm
		Method of application	Tape one ½ lap layer
7	Sewn	Process	Needle & thread
		Method of application	Finish of the final tape with a needle & thread

Assembling of interpole coils, 6E/6E1			
Item No	Item description		Minimum requirements/ process description
8	Pole piece insulation	Material	Calendared aramid Nomex 410 “B” stage 0.25mm
		Method of application	Wrap pole piece before fitting the coil
9	Coil support	Material	Delmat strip 0.8mm
		Method of application	Placed on the pole piece edge to protect/support the coil
10	Nomex felt washer	Material	Aramid Nomex felt washer 2mm
		Method of application	Position flush with surface of the coil and the

			pole piece on the frame side
11	Fillers	Material	Non slum Putty
		Method of application	Apply putty to gaps ensuring a smooth uniform between pole piece and coils or with a 2mm poromat
12	Release agent	Material	Teflon coated sheet bigger that the coil and the pole piece
		Method of application	Used as release agent, on coil base during VPI processing on the steel jig/plates

DRAWING NUMBER: RT-BCD-28



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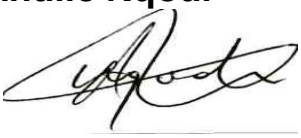
SIGNATURE	
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