



Report

TRANSMISSION

Title: **TECHNICAL EVALUATION
CRITERIA FOR FIBRE OPTIC
HARDWARE**

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1. Introduction

This document aims to describe the criteria which will govern the evaluation of tender submissions by external suppliers intending to supply fibre optic hardware. The criteria for each fibre hardware are tabulated in the annexes at the end of this document. Hardware refers to all assemblies and individual components required to connect mechanically and electrically the fibre optic cable from one point to another.

The criteria necessary to perform both the desktop and factory evaluations are outlined.

2. Supporting clauses

2.1 Scope

This document explains the technical evaluation process and criteria associated with fibre optic hardware as described by the relevant Eskom standards.

2.1.1 Purpose

The purpose of this document is to describe the criteria which are to be used when evaluating tender submissions for the supply of fibre optic hardware as described above.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] 32-1034 - Eskom Procurement and Supply Management Procedure.
- [2] 240-110403330 - OPGW Hardware and Installation Requirements for Overhead Lines
- [3] 240-72274816 - Fibre Optic Cable Joint Enclosures for Aerial Cables.
- [4] 240-70732888 – Fibre Optic Cable System Acceptance Testing.
- [5] 240-70733995 – Optical Distribution Frame / Patch Panel
- [6] 240-42990189 - Externally Attached (Helically Wrapped) Fibre Optic Cable
- [7] 240-106030205 – Fibre Optic Gantry to Substation Control Room Scope of Work Guideline
- [8] 240-60777474 – Specification for Suspension and Strain Assemblies and for Hardware for Transmission Lines
- [9] NRS 061-1: Overhead Groundwire with Optical Fibre Part 1: Product Specification.
- [10] NRS 061-2: Overhead Groundwire with Optical Fibre Part 2: Installation Guidelines.
- [11] NRS 078-1: 2014 – Long Span Self Supporting Dielectric Fibre Optic Cables Part 1: Product Specification.
- [12] NRS 078-2: 2005 - Long Span Self Supporting Dielectric Fibre Optic Cables Part 2: Installation Guidelines.

- [13] NRS 088-1: 2007 – Duct and Direct Buried Underground Fibre Optic Cable Part 1: Product Specification.
- [14] NRS 088-2: 2009 - Duct and Direct Buried Underground Fibre Optic Cable Part 2: Installation Guidelines.
- [15] ISO 9001 Quality Management Systems.

2.2.2 Informative

None

2.3 Definitions**2.3.1 Disclosure classification**

Controlled disclosure: Controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
ADSS	All Dielectric Self Supporting
CV	Curriculum Vitae
OEM	Original Equipment Manufacturer
OPGW	Optical Ground Wire
PLS-CADD	Power Line Systems - computer aided design and drafting

3. Technical Tender Evaluation Procedure

The technical evaluation procedure is specific to each item type. The items mainly include Fibre Optic Cable associated hardware assemblies. For each of these cable types there are unique hardware arrangements which are required to attach the cables to supporting structures such as transmission towers.

The complete evaluation of any potential supplier would involve a desktop evaluation. A factory assessment will be done at contract award or before the first order is done.

Table 1: Evaluation explained

Item number	Applicable documentation	RESPONSIBILITY	Comments
1	Annex A – HARDWARE SCORE SHEET FOR OPGW	Eskom	Eskom uses submitted Annex N.1 and Annex C SUBMITTED INFORMATION TO COMPLETE-Complete section 1 only at this stage

Item number	Applicable documentation	RESPONSIBILITY	Comments
2	Annex B – HARDWARE SCORE SHEET FOR ADSS HARDWARE	Eskom	Use information submitted for Annex N.2 TO COMPLETE-Complete section 1 only at this stage
3	Annex C – FACTORY ASSESSMENT SHEETS-FIBRE OPTIC HARDWARE	Eskom	Use section 3 of submitted file Annex C information.
4	Annex N.1 OPGW Hardware Requirements	Eskom	Indexed file section 1, contains this information - Eskom to score supplier based on information submitted- final score to be populated in Annex A, section 2
5	Annex N.2 ADSS Hardware Requirements	Eskom	indexed file section 2, contains this information- Eskom to score supplier based on information submitted- final score to be populated in Annex B, section 2
6	Final technical evaluation report compilation	Eskom	
7	Annex N.1 OPGW Hardware Requirements	Supplier	Indexed file section 1, contains this information
8	Annex N.2 ADSS Hardware Requirements	Supplier	Indexed file section 2, contains this information
9	Annex C – FACTORY ASSESSMENT SHEETS-FIBRE OPTIC HARDWARE	Supplier	Indexed file section 3, contains this information

3.1 Desktop Evaluation

The desktop evaluation forms the first aspect of the assessment. During this process, the tender documentation submitted by potential suppliers is evaluated against the criteria listed in the attached Annexes from page 8 to 19 in this document. The Eskom evaluating representatives will go through the details of the returnable submissions that are required and will ensure that the Gatekeeper criteria are met. Submissions that receive a "No" on any of the Gatekeeper criteria, the supplier will not be able to proceed to the Desktop Evaluation and therefore will fail the technical evaluation.

From a technical perspective, the submitted documentations should consist of but not be limited to:

3.1.1 Hardware Evaluation – the suppliers will be scored according to score sheets in Annexes A, B, C, N1 and N2

- a) Supplier needs to submit hardware drawings and other technical details for all assemblies and components for appropriate fibre system being tendered for and should adhere to 240-60777474 – Specification for Suspension and Strain Assemblies and for Hardware for Transmission Lines, need to add NRS, Eskom spec for OPGW hardware.
- b) An indication of the manufacturing capacity of the factory and lead times. Tenderers to submit details of manufacturing premises, location, staff and equipment, testing facilities, manufacturing lead times.
- c) It must be noted that before any fibre optic cable is used on Eskom's system, a mechanical compatibility test shall be done with the designated hardware. Agreement between prospective fibre optic cable supplier and prospective hardware supplier shall be concluded where necessary based on the procurement strategy (free issue or supplied by contractor). Eskom's only responsibility with this aspect is to review the final test results and on occasion witness these tests as per previous statement (free issue or supply by contractor).
- d) Suppliers using international manufacturing facilities and expertise need to supply details of local supporting office. (Based on current DTi instructions, only local manufacturers are allowed at this stage as these commodities are 100% local designated. If requirements change, above statement will apply).
- e) The hardware tender returnable shall have the following deliverables for OPGW and ADSS.

Table 2: Technical requirements

Hardware	
1	Drawings of all assemblies with necessary details as per Annexes N1 and N2 and applicable technical OPGW, ADSS and DUCT specifications. Drawings to be provided for 16kA OPGW size, but information are requested for suspension and deadened units that cater for 9mm to 22mm OPGW sizes.
2	Compatibility mechanical tests with cables and fittings. (Based on previous supply, new ones to be done with new cables when required).
3	Details of Manufacturing premises, location, staff and equipment, testing facilities, manufacturing lead times.
4	Local support details.
5	Transporting and labelling of boxes

Table 3: Score Allocations-Thresholds

Criteria (Technical)	Weightings (%)
Phase 1 - Compliance to Eskom technical specifications in tender submissions. Comprises of the Fibre hardware assessment. Complete Annex A and B.	100%
Overall minimum threshold for qualification(s)	75%

4. Authorization

This document has been seen and accepted by:

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Name and surname	Designation
N/A	N/A

5. Revisions

Date	Rev	Compiler	Remarks
Sep 2023	0	B. Haridass,	Required for Commercial processes.

6. Development team

The following people were involved in the development of this document:

- Ameet Nathoo
- Bharat Haridass

7. Acknowledgements

Not applicable.

Annex A – Hardware Score Sheet for OPGW

OPGW hardware Gatekeepers				
Item	Criteria	Comply	Comments	
1.1	Drawings of assemblies to be provided for 16kA OPGW cable in English. Use ANNEX N.1 INFORMATION.			
1.2	Drawings of suspension units to cater for OPGW size from 9mm to 22mm. Use ANNEX N.1 INFORMATION.			
1.3	Drawings of preformed dead-end units to cater for OPGW size from 9mm to 22mm. Use ANNEX N.1 INFORMATION.			
1.4	Details on manufacturing facility for the fibre optic hardware and testing facility for OPGW with associated hardware. Use ANNEX C SUBMITTED INFORMATION.			
	OPGW hardware Desktop Evaluation			
Item	Criteria	Score	Actual	Comments
2.1	Compliance with drawings listed (ANNEX N.1) check number	183		
	Subtotal	183	0	
	Threshold	137.25		

Annex B – Hardware Score Sheet for ADSS Hardware

ANNEX B- ADSS HARDWARE SCORE SHEET				
ADSS hardware Gatekeepers				
Item	Criteria	Comply	Comments	
1.1	Drawings of assemblies to be provided for ADSS cable in English. Use information submitted for ANNEX N.2 TO COMPLETE			
ADSS hardware Desktop Evaluation				
Item	Criteria	Score	Actual	Comments
2.1	Compliance with drawings listed (ANNEX N.2)	10		
Subtotal		10	0	
Threshold		7.5		

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Annex C – Factory Assessment Sheets-Fibre Optic Hardware-Desktop

Factory assessment for fibre cable hardware-Desktop.		
Item	Criteria	Score
1	<p>Ability to manufacture complete assemblies including all shackles, yokes and other hardware components that make up the assemblies. Evidence that complete assemblies can be supplied. Documents or company catalogue to be submitted to verify this aspect. If some components are outsourced, need to assess these sub-contractors. Assessment can be evaluation of documents and sample for that component or an actual factory assessment where that component is made.</p> <p>1) Manufacture of complete assemblies-1 2) Company catalogues for hardware-1 3) Assessments of sub-contractors-1</p>	3
2	<p>Ability to manufacture complete assemblies for various KA rating for OPGW. OPGW ratings from 5kA to 21kA. (5kA, 10kA, 12kA, 16kA, 18kA and 21kA). One point for every kA cable.</p> <p>1) Suspension assemblies-insulated and non-insulated for self-supporting and cross rope towers- 4 assemblies (0.125 points per assembly). 2) Strain assemblies- insulated and non-insulated for self-supporting towers- 2 assemblies-(0.125 points per assembly). 3) Down lead clamps-insulated and non-insulated- 2 types-(0.125 points per assembly).</p>	6
3	<p>Ability to manufacture complete assemblies for various KN rating for OPGW. OPGW UTS ratings from 60KN and above.</p> <p>1) Ratings of individual items to meet criteria</p>	2
4	Confirm that manufacturing, design and testing will be in accordance with SANS IEC 61284:1997 and Eskom hardware specification-240-60777474. Letter stating this aspect to be submitted, as well as company policies stating this requirement.	2
5	Show evidence of Type testing on each individual item, in accordance with SANS IEC 61284: 1997 and relevant Eskom product specification -240-60777474. Tenderer to provide a list of components with relevant type test reports – limit list to following components <p>1) Components used in suspension assemblies for OPGW 2) Components used in strain assemblies for OPGW</p>	2
6	Show evidence of Production testing in accordance with SANS IEC 61284: 1997 and relevant Eskom product specification-240-60777474. For this tender, documents showing that the above requirements can be met. Testing facilities and documents to be assessed. (Production tests are done during manufacture of a certain order, samples removed and tested to verify order). Provide generic Production test procedures/ check sheets used and ITP's.	2

Item	Criteria	Score
7	Raw material incoming assessment, testing and storage.	3
8	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce FORGED components. E.g., shackles, thimbles, load bearing items out of steel.	3
9	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce CAST components. E.g., suspension clamps, down lead clamps, etc.	3
10	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce PLATE components. E.g., extension links, yoke plates, sag adjusters.	3
11	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce WIRE components. E.g., strain dead ends, armour rods, earth bonds, current transfer connections etc.	3
12	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce Non-metallic components. EG- rubber inserts for the suspension clamps, inserts for vibration dampers.	3
13	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce Vibration dampers .	3
14	Factory walk down to confirm that tenderer has required equipment, staff and associated facilities to produce Slack brackets, joint boxes, etc. other items not covered above.	3
15	Can provide typical packaging details of items after manufacture, treatment of wooden crates etc. if applicable.	2
16	Marking on packaging as per Eskom requirements	1
17	Handling and storage requirements of products.	2
18	Capacity and capability of manufacturing plant- look at monthly output capacity and what is their current capabilities.	2
19	Final product storage facilities within factory before dispatch	2
20	Requirements for having spares available.	2
Workshop Practice		
21	Housekeeping- cleanliness of factory	1
22	Control of scrap material	2
Design Practices and Application		
23	Design criteria basis and guidelines- demonstrate design capabilities for existing and new item.	1
24	Design process flow- steps followed to finalise a design of components	1
25	Interface with procurement and manufacturing during design stage	2
26	Design tools and competence- software and hardware	1

Item	Criteria	Score
27	Design Technology Backup- safekeeping of designs	1
28	Research and Development capabilities- keeping up with new technologies.	1
	Testing Facility and Practices	
29	Calibration of testing equipment	3
30	Test capabilities- equipment range and sizes.	3
31	Competence of technicians- qualifications and experience	3
32	Testing procedures alignment with IEC	3
33	Quality and availability of test reports	3
		3
	Total Score	80

Annex N.1 - OPGW Hardware Requirements

ITEM DESCRIPTION	OPGW HARDWARE CRITERIA	Score
Insulated Strain Assembly		
Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble.	3
Insulator dimensions and strength	1. Length 2. Material type 3. Creepage 4. End fitting descriptions 5. Type of arcing horn.	5
Drawing number/ Code	1. Supplier drawing provided for assembly.	1
Non-Insulated Strain Assembly		
Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Earth bond connection	1. Type of connection for earth bond provided 2. Connection of earth bond method to tower 3. Connection of earth bond to OPGW 4. Length of earth bond provided 5. Type of earth bond material (flexibility etc.).	5
Earth bond current rating- greater than or equal to OPGW rating.	1. Provide earth bond rating for 1 sec.	1
Hardware strength	1. Equal to 120kN	
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble.	3
Drawing number	1. Supplier drawing provided for assembly.	1
Non-Insulated Suspension Assembly		
AGS clamp	1. Neoprene insert	1

Earth bond connection	1. Type of connection for earth bond provided 2. Connection of earth bond method to tower 3. Connection of earth bond to OPGW 4. Length of earth bond provided 5. Type of earth bond material (flexibility etc.).	5
Earth bond current rating- greater than or equal to OPGW rating.	1. Provide earth bond rating for 1 sec.	1
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. AGS Clamp 3. Armour rod and reinforcing rod	3
Drawing number	1. Supplier drawing provided for assembly.	1
Insulated Suspension Assembly		
AGS clamp	1. Neoprene insert	1
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. AGS Clamp 3. Armour rod and reinforcing rod	3
Insulator dimensions and strength	1. Length 2. Material type 3. Creepage 4. End fitting descriptions 5. Type of arcing horn.	5
Drawing number	1. Supplier drawing provided for assembly.	1
Non-Insulated Strain Assembly for Joint		
Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Earth bond connection	1. Type of connection for earth bond provided 2. Connection of earth bond method to tower 3. Connection of earth bond to OPGW 4. Length of earth bond provided 5. Type of earth bond material (flexibility etc.).	5
Earth bond current rating- greater than or equal to OPGW rating.	1. Provide earth bond rating for 1 sec.	1
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble. 4. Current transfer saddles	4

Drawing number	1. Supplier drawing provided for assembly.	1
Insulated Strain Assembly for Joint		
Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble. 4. Current transfer saddles	4
Insulator dimensions and strength	1. Length 2. Material type 3. Creepage 4. End fitting descriptions 5. Type of arcing horn.	5
Drawing number/ Code	1. Supplier drawing provided for assembly.	1
Assembly for cross rope towers. - Insulated (With post insulator)		
AGS clamp	1. Neoprene insert	1
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. AGS Clamp 3. Armour rod and reinforcing rod	3
Insulator dimensions and strength	1. Relevant dimensions (diameter + hole positions) 2. Material type 3. Creepage 4. End fitting descriptions 5. Type of arcing horn. 6. Specified cantilever load	6
Drawing number	1. Supplier drawing provided for assembly.	1
Assembly for cross rope towers - Non-Insulated (Same as non-insulated suspension but with long bolts and spacers)	1. Longer bolts and spacers provided. 2. Drawing provided.	1
Non-Insulated assembly for conversion of suspension tower to non-insulated joint position		

Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Earth bond connection	1. Type of connection for earth bond provided 2. Connection of earth bond method to tower 3. Connection of earth bond to OPGW 4. Length of earth bond provided 5. Type of earth bond material (flexibility etc.).	5
Earth bond current rating- greater than or equal to OPGW rating.	1. Provide earth bond rating for 1 sec.	1
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble. 4. Current transfer saddles 5. Yoke plate	5
Drawing number	1. Supplier drawing provided for assembly.	1
Insulated Assembly for conversion of suspension tower to insulated joint position.		
Pre-formed type fittings	1. Attachment to OPGW is off preformed type (helically wrapped around the OPGW) 2. Type of material specified 3. Number of preformed wires specified 4. Length specified 5. Drawing provided of typical strain dead-end 6. Thimble specification provided.	6
Hardware strength	1. Equal to 120kN	1
Material types	1. Material types specified for hardware 2. Preformed strain assembly 3. Thimble. 4. Current transfer saddles 5. Yoke Plate	5
Insulator dimensions and strength	1. Length 2. Material type 3. Creepage 4. End fitting descriptions 5. Type of arcing horn.	5
Drawing number/ Code	1. Supplier drawing provided for assembly.	1
Vibration dampers - Stockbridge preformed type.		
Clamping mechanism	Must be of non-bolted type	1

Material	Suitable material to avoid galvanic corrosion	1
Joint boxes insulated		
Entry ports	1. Must be capable of multiple re-entries without damage to sealing mechanism. 2. 4 x entry ports and must be re-sealable.	2
Swivel Seats on attachment bracket	1. To avoid damaging tower steelwork	1
Material	1. High quality aluminium alloy or stainless steel - must be non-corrosive. 2. Base plate and casing to be of the same material	2
Opening and Closing	1. Easy to open and close without the need for specialised tools	1
Plugs	1. 2 x disposable plugs for temporary protection of cable ports 2. Minimum of 2 x aluminium plugs to seal unused cable ports	2
Sealing	1. Ensure that the joint box is water-tight, pressure-tight and able to be opened when needed. 2. Four compression glands and associated adapters required.	2
Splice trays	1. Minimum of one fan-out tray + multiple organiser trays. 2. Each tray to accommodate a minimum of 12 fibres + spare fibre length. 3. 4 x transportation tubes per tray. 4. Trays must allow for minimum bending radius of 45mm	4
Strain relief clamping bracket	1. Shall allow mechanical fastening of different sizes of the optical fibre cable in the enclosure	1
Insulator dimensions and strength	1. Length 2. Material type 3. Creepage	3
Joint boxes non-insulated		
Entry ports	1. Must be capable of multiple re-entries without damage to sealing mechanism. 2. 4 x entry ports and must be re-sealable.	2
Swivel Seats on attachment bracket	1. To avoid damaging tower steelwork	1
Material	1. High quality aluminium alloy or stainless steel - must be non-corrosive. 2. Base plate and casing to be of the same material	2
Opening and Closing	1. Easy to open and close without the need for specialised tools	1
Plugs	1. 2 x disposable plugs for temporary protection of cable ports 2. Minimum of 2 x aluminium plugs to seal unused cable ports	2

Sealing	1. Ensure that the joint box is water-tight, pressure-tight and able to be opened when needed. 2. Four compression glands and associated adapters required.	2
Splice trays	1. Minimum of one fan-out tray + multiple organiser trays. 2. Each tray to accommodate a minimum of 12 fibres + spare fibre length. 3. 4 x transportation tubes per tray. 4. Trays must allow for minimum bending radius of 45mm	4
Strain relief clamping bracket	1. Shall allow mechanical fastening of different sizes of the optical fibre cable in the enclosure	1
Down lead clamps insulated		
Interchangeability	1. Must be able to attach to any tower steel member size	1
Material	1. No galvanic corrosion to be induced between clamp and tower steelwork	1
Swivel Seats	1. Damage to tower galvanising to be avoided	1
Insulator	1. Length 2. Material type 3. Creepage	3
Down lead clamps non-insulated		
Interchangeability	1. Must be able to attach to any tower steel member size	1
Material	1. No galvanic corrosion to be induced between clamp and tower steelwork	1
Swivel Seats	1. Damage to tower galvanising to be avoided	1
Individual Suspension Unit detail		
Range of suspension units	1. Catalogue of suspension unit sizes to cater for different OPGW sizes ranging from 9mm to approximately 22mm	1
Individual Dead-end Unit detail		
Range of preformed dead-end units	1. Catalogue of preformed dead-end unit sizes to cater for different OPGW sizes ranging from 9mm to approximately 22mm	1
Earth bond		
Range of earth bonds	1. Catalogue of earth bond sizes to cater for different OPGW ratings ranging from 5kA to 21kA	1
Manufacturing plant details		
Details of Manufacturing premises, location, staff and equipment, testing facilities, manufacturing lead times.	Provide information regarding manufacturing plant address, staff details and equipment & testing facilities including manufacturing lead times.	1

Annex N.2 – ADSS Hardware Requirements

	ADSS HARDWARE CRITERIA	Score
ITEM DESCRIPTION		
Tension Assembly	As per NRS 078-2: 2005, section 4.4.5 a	
	Drawing provided	2
Suspension assembly	As per NRS 078-2: 2005, section 4.4.5 b	
	Drawing provided	2
Aeolian vibration dampers	As per NRS 078-2: 2005, section 4.4.5 c	
	Drawing provided	2
Clamps	As per NRS 078-2: 2005, section 4.4.5 d	
	Drawing provided	2
Splicing enclosures	As per NRS 078-2: 2005, section 4.4.5 e	
	Drawing provided	2