



Kenya Power

**HYDRAULIC PULLER TENSIONER STRINGING
EQUIPMENT
— SPECIFICATION**

A Document of the Kenya Power & Lighting Company Plc.

February 2023



TITLE:
**HYDRAULIC PULLER
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EQUIPMENT
— SPECIFICATION**

Doc. No.	KP1/13D/4/1/TSP/09/118
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01. Circulation List

COPY NO.	COPY HOLDER
1	Manager, Standards
Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)	

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards Department, are welcome.

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Users are reminded that by virtue of section 25 of the Copyright Act, 2001 (Revised 2014) Cap 130 of the Laws of Kenya copyright subsists in all KPLC standards and except as provided under section 26 of this act, no KPLC standard produced by KPLC may be reproduced, stored in retrieval system by any means without prior permission from the Managing Director & CEO, KPLC.

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0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue1 Rev 0	2023-02-13	New Issue	1. Eng. Benson Dianga 2. Rotich Benard	Dr. Eng. P. Kimemia

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FOREWORD

This specification has been prepared by the Standards Department and Transmission Department, both of the Kenya Power & Lighting Company Plc (herein called Kenya Power). It lays down requirements for the Hydraulic Puller Tensioner Stringing Equipment herein called 'the equipment'.

The Hydraulic Puller Tensioner Stringing Equipment is designed to operate both as a tensioner and as a puller, fit to string on a rope or conductor. They shall be used for stringing conductors or OPGW on overhead transmission line.

This specification stipulates the minimum requirements for the Hydraulic Puller Tensioner acceptable for use in the company and it shall be the responsibility of suppliers and manufacturers to ensure that the offered design is of the highest quality and guarantees excellent service to Kenya Power.

Users of this Kenya Power specification are responsible for its correct interpretation and application.

The following are members of the team that developed this specification:

No	Name	Department
1.	Eng. Sande Omondi Semo	Transmission
2.	Eng. George Korir	Transmission
3.	Eng. Benson Dianga	Standards
4.	Rotich Benard	Standards

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1. SCOPE

This specification is for Hydraulic Puller Tensioner Stringing Equipment, diesel engine operated, and of digital type, designed to operate both as a tensioner and as puller. They shall be used for stringing one or more conductors or OPGW on overhead transmission lines.

2. NORMATIVE REFERENCES

The following standards contain provision, which, through reference in this text, constitute provisions of this specification. For dated editions, the cited edition will apply; for undated editions, the latest edition of the referenced document shall apply.

EC Directive 97/68/CE with its subsequent amendments and additions — Qualitative detection of thermal irregularities in building envelopes — Infrared method

ISO 10880: Non-destructive testing — Infrared thermographic testing — General principles

ISO 18434-1: Condition monitoring and diagnostics of machines — Thermography — Part 1: General procedures.

3. DEFINITIONS AND ABBREVIATIONS

3.1. Definitions

For the purpose of this specification, the definitions given in the reference standards and specifications shall apply.

3.2. Abbreviations

For the purpose of this specification, the abbreviations given in the reference standards and specifications shall apply.

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

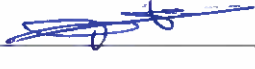
The Hydraulic Puller Tensioner Stringing Equipment shall be suitable for continuous use outdoors in tropical areas:

- at altitudes of up to 2200m above sea level,
- humidity of up to 90%,
- average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C and
- heavy saline conditions along the coast.

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4.2. DESIGN AND CONSTRUCTION

4.2.1. General Requirements

- 4.2.1.1. The Hydraulic Puller Tensioner Stringing Equipment shall be designed to operate both as a tensioner and as a puller, fit to string one or two ropes, conductors, or OPGW on overhead transmission lines.
- 4.2.1.2. In tensioner mode, one hydraulic circuit shall tension at constant force even during varying speed of stringing.
- 4.2.1.3. In puller mode, one hydraulic circuit shall continuously vary the speed in both directions.



Figure 1: Typical Hydraulic Puller Tensioner Stringing Equipment

4.2.2. Specific Requirements

- 4.2.2.1. The Hydraulic Puller Tensioner Stringing Equipment shall be powered by a water cooled diesel engine of at least 70hp (50 kW power rating) and a 12V Electrical System.
- 4.2.2.2. The equipment shall be of digital type, having machine control panel equipped with built-in electronic instrument featuring a USB port and a large graphic color display of a least 7" with the main functions including:
 - a) display of pull-force,
 - b) speed and length of cable in real time,

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- c) max pull force setting,
- d) display of working hours,
- e) data recording and storage on a pen-drive (data processing software provided)

4.2.2.3. The equipment shall have chassis with rigid axle, manual brake and detachable drawbar for towing at low speed in job-site.

4.2.2.4. The equipment shall have two bull wheels (Capstans) with the capstan/Bull drum having at least 6 no. grooves.

4.2.2.5. The equipment shall have a safety negative self-acting hydraulic brake and shall also have hydraulic front and/or back stabilizers

4.2.2.6. The equipment shall have device/option to control low force tensions of between 2-15kN for stringing of OPGW, etc.

4.2.2.7. The equipment shall use oil cooling for hydraulic oil system.

4.2.2.8. The equipment shall have a grounding connection point.

4.2.2.9. The equipment shall have attachment for anchoring and lifting.

4.2.2.10. The equipment shall have a pull and speed printer for the electronic recorder with accessories

4.2.2.11. The equipment shall support the English language.

4.2.2.12. The particular requirements of the equipment shall be as per Table 2:

Table 1: Hydraulic Puller Tensioner Requirements

No.	PARAMETERS	REQUIREMENTS
1.	Bull Wheel (Capstan) Diameter	1500mm
2.	Bull Wheel (Capstan) Grooves No.	>6
3.	Maximum Pull (tension force)	> 45kN
4.	Speed at Maximum Pull	> 1.5km/h
5.	Maximum speed	5km/h
6.	Maximum Conductor Diameter	>42mm
7.	Maximum weight	5,000kgs
8.	Engine	Diesel
9.	Engine rating	>74hp / 55.4kW
10.	Engine cooling	Water

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11.	Engine electrical system	12V
12.	Control Panel	Digital HMI with 7" large coloured graphics display with recorder, pull and speed printer
13.	Remote Control	Radio remote control with total user machine control while integrating with the HMI in the control panel

4.2.3. Mobile Electronic Devices

- 4.2.3.1. Each equipment will come with mobile electronic devices (laptops and mobile radios) for purposes of data analysis and operation.
- 4.2.3.2. Each equipment shall have a portable remote radio control to provide total user machine control while integrating with the digital user interphase.
- 4.2.3.3. The particular parameter requirements of the associated mobile electronic devices for operation and data analysis shall be as per Table 2 below:

Table 2: Mobile Electronic Devices Particular Requirements

PARAMETERS	REQUIREMENTS
A. Laptop	
1. Processor	8-core CPU with 4 performance cores and 4 efficiency cores
2. Memory	8gb RAM
3. Storage	512gb SSD (configurable to 1TB or 2TB)
4. Operating System	macOS
5. Display	Retina display, 13.3-inch (diagonal) LED-backlit display with IPS technology; 2560-by-1600 native resolution at 227 pixels per inch with support for millions of colours
6. Device Colour	Gold
7. Battery Operating Time	15 – 18 hours
8. Power	Built-in 49.9-watt-hour lithium-polymer battery, 30W USB-C Power Adapter
9. Charging and expansion	Two Thunderbolt / USB 4 ports with support for: charging, display port, Thunderbolt 3 (up to 40Gb/s), USB 4 (up to 40Gb/s), USB 3.1 Gen 2 (up to 10Gb/s), 3.5 mm headphone jack
10. Keyboard and trackpad	Backlit Magic Keyboard with:

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	<ul style="list-style-type: none"> a) 78 (U.S.) or 79 (ISO) keys including 12 function keys and 4 arrow keys in an inverted-T arrangement, b) Ambient light sensor, c) Force Touch trackpad for precise cursor control and pressure-sensing capabilities; enables Force clicks, accelerators, pressure-sensitive drawing, and Multi-Touch gestures
11. Wireless	<ul style="list-style-type: none"> a) Wifi: 802.11ax Wi-Fi 6 wireless networking IEEE 802.11a/b/g/n/ac compatible b) Bluetooth: Bluetooth 5.0 wireless technology
12. Camera	720p FaceTime HD camera, advanced image signal processor with computational video
13. Audio	<ul style="list-style-type: none"> a) Stereo speakers b) Wide stereo sound c) Support for Dolby Atmos playback d) Three-mic array with directional beamforming e) 3.5 mm headphone jack
14. Operating requirements	<ul style="list-style-type: none"> a) Line voltage: 100V to 240V AC b) Frequency: 50Hz to 60Hz c) Operating temperature: 50° to 95° F (10° to 35° C) d) Storage temperature: -13° to 113° F (-25° to 45° C) e) Relative humidity: 0% to 90% noncondensing f) Operating altitude: tested up to 10,000 feet g) Maximum storage altitude: 15,000 feet h) Maximum shipping altitude: 35,000 feet
15. Size and weight	<ul style="list-style-type: none"> a) Height: 0.16–0.63 inch (0.41–1.61 cm) b) Width: 11.97 inches (30.41 cm) c) Depth: 8.36 inches (21.24 cm) d) Weight: 2.8 pounds (1.29 kg)

B. Two Way Radio

1. General	Rugged for outdoor use and robust.
2. Channels	16 minimum
3. Coverage	Up to 9kms line of sight
4. Privacy codes	Over 200
5. Dimensions	No larger than 120x60x40
6. Weight	275 grams maximum
7. Sealing	IP55
8. Dust and Humidity	EIA 603

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9. Shock Vibration	Polycarbonate Housing passes EIA 603
10. Average battery life	Up to 20Hrs with battery save on
11. Storage	Carry Holster with swivel belt clip
12. Charger	Stand-alone Charging station for easy operation

5. TESTS AND INSPECTION

The equipment shall be inspected and tested in accordance with relevant International Standards and the requirements of this specification.

6. MARKING AND PACKING

6.1. MARKING

The equipment shall be legibly and indelibly marked with the following information:

- a) Model or reference type;
- b) Name or Trade name of the manufacturer;
- c) Year of Manufacture;
- d) Batch or serial number;
- e) The words "PROPERTY OF KENYA POWER AND LIGHTING COMPANY";

6.2. PACKING

- 6.2.1. The equipment shall be packed in a manner to protect it from damage during transportation and storage.
- 6.2.2. Instruction of storage, handling and installation shall be included in each package, all in English language.

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APPENDICES

APPENDIX A: TESTS AND INSPECTION (NORMATIVE)

- A.1. Copies of previous Test Reports for the tools issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. The accreditation certificate for the third party testing laboratory shall also be submitted with the tender (all in English Language).
- A.2. After manufacture of the items, they shall be subjected to factory acceptance tests (FAT) before shipment/delivery of the goods that shall be witnessed by two Kenya Power engineers at the factory. Supplier shall invite KPLC in adequate time to facilitate good preparation for the exercise.
- A.3. On receipt of the equipment, Kenya Power shall inspect and may perform tests in order to verify compliance with the specification and relevant standards. The supplier shall replace without charge to KPLC any equipment which fail to meet any of the requirements during inspection/test at stores

APPENDIX B: QUALITY MANAGEMENT SYSTEM (NORMATIVE)

- B.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015
- B.2. The Manufacturer's Declaration of Conformity to reference standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2015 certificate shall be submitted with the tender for evaluation.

APPENDIX C: TECHNICAL DOCUMENTATION (NORMATIVE)

- C.1. The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
- a) Fully-filled clause by clause Guaranteed Technical Particulars (GTPs)- Appendix D - stamped and signed by the manufacturer.
 - b) Product technical datasheets with details of the equipment to be manufactured for KPLC

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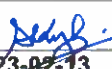

- c) Copies of the Manufacturer's catalogues, brochures;
- d) Marking details and method to be used in marking the equipment.
- e) Copies of previous test certificates and test reports (As given in Clause A.2) by the relevant International or National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 accredited independent laboratory) shall be submitted with the offer for evaluation. A copy of accreditation certificate for the laboratory shall also be submitted (all in English Language);
- f) Marking & Packaging details (including packaging materials).

C.2. The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company Plc. for approval before manufacture:

- a) Fully filled clause by clause Guaranteed Technical Particulars (GTPs) stamped and signed by the manufacturer (**these are not the ones submitted with the tender**);
- b) Technical data sheets with details of the tools, batteries & accessories to be manufactured for KPLC
- c) Detailed test program to be used during factory testing;
- d) Marking details and method to be used in marking the tools, batteries & accessories.
- e) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfil the requirements stated in the contract documents, standards, specifications and regulations.

C.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery to KPLC stores

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APPENDIX D: GUARANTEED TECHNICAL PARTICULARS (GTPS) — NORMATIVE

(to be filled and signed by the Supplier and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation, all in English Language)

Tender No.

Bidder's name and Address.....

Clause number	Details and KPLC requirement		Bidder's offer (indicate full details)	
	Manufacturer's Name and address		<i>Specify</i>	
	Country of Manufacture		<i>Specify</i>	
	Bidder's Name and address		<i>Specify</i>	
1.	Scope		<i>Specify</i>	
2.	References		<i>Specify</i>	
4.	Requirements			
4.1	Service Conditions			
	Operating conditions	Altitude	2200m	<i>State</i>
		Humidity	95%	<i>State</i>
		Average Ambient temperature	-20°C to 50°C ambient 30°C	<i>State</i>
	Saline Condition	Heavy coastal	<i>State</i>	
4.2	DESIGN AND CONSTRUCTION			
4.2.1	General Requirements			
4.2.1.1	Design and operation		<i>Specify</i>	
4.2.1.2	In tensioner mode		<i>State</i>	
4.2.1.3	In Puller mode		<i>State</i>	
4.2.2	Specific requirements			
4.2.2.1	Engine	Water cooled Diesel	<i>Specify</i>	
		>74hp/55.4kW	<i>Specify</i>	
		12V Electrical System	<i>Specify</i>	
4.2.2.2	Equipment's Control has built-in electronic instrument with	Digital type	<i>Specify</i>	
		Has machine control panel	<i>State</i>	
		Has USB port	<i>State</i>	
		graphic color display size	<i>State</i>	
		Functions	<i>State</i>	
4.2.2.3	Chassis details		<i>State</i>	
4.2.2.4	Bull wheel details		<i>State</i>	
4.2.2.5	Brake details			

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Clause number	Details and KPLC requirement	Bidder's offer (indicate full details)	
	Stabilizer details	<i>Specify</i>	
4.2.2.6	Option for low forces tensions	<i>Specify</i>	
4.2.2.7	Hydraulic cooling system	<i>Specify</i>	
4.2.2.8	Grounding	<i>Specify</i>	
4.2.2.9	Lifting and anchoring provision	<i>Provide</i>	
4.2.2.10	Printer and Electronic Recorder	<i>Provide</i>	
4.2.2.11	Language	<i>Specify</i>	
	Hydraulic Puller Tensioner Requirements		
	No. PARAMETERS	REQUIREMENTS	
	1. Bull Wheel (Capstan) Diameter	1500mm	<i>Specify</i>
	2. Bull Wheel (Capstan) Grooves No.	>6	<i>Specify</i>
	3. Maximum Pull (tension force)	> 45kN	<i>Specify</i>
	4. Speed at Maximum Pull	> 1.5km/h	<i>Specify</i>
	5. Maximum speed	5km/h	<i>Specify</i>
	6. Maximum Conductor Diameter	>42mm	<i>Specify</i>
	7. Maximum weight	5,000kgs	<i>Specify</i>
	8. Engine	Diesel	<i>Specify</i>
	9. Engine rating	>74hp / 55.4kW	<i>Specify</i>
4.2.1.12 Table 1	10. Engine cooling	Water	<i>Specify</i>
	11. Engine electrical system	12V	<i>Specify</i>
	12. Control Panel	Digital HMI with 7" large coloured graphics display with recorder, pull and speed printer	<i>Specify</i>
	13. Remote Control	Radio remote control with total user machine control while integrating with the HMI in the control panel	<i>Specify</i>
4.2.3	Mobile Electronic Devices		
4.2.3.1	Each equipment comes with mobile electronic devices	<i>State the devices</i>	
4.2.3.2	equipment has a portable remote radio control to provide total user machine control while integrating with the digital user interphase	<i>Specify</i>	
4.2.3.3 Table 2	Mobile Electronic Devices Particular Requirements		
	A. Laptop		

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Clause number	Details and KPLC requirement		Bidder's offer (indicate full details)
	1. Processor	8-core CPU with 4 performance cores and 4 efficiency cores	<i>Specify</i>
	2. Memory	8gb RAM	<i>Specify</i>
	3. Storage	512gb SSD (configurable to 1TB or 2TB)	<i>Specify</i>
	4. Operating System	macOS	<i>Specify</i>
	5. Display	Retina display, 13.3-inch (diagonal) LED-backlit display with IPS technology; 2560-by-1600 native resolution at 227 pixels per inch with support for millions of colours	<i>Specify</i>
	6. Device Colour	Gold	<i>Specify</i>
	7. Battery Operating Time	15 – 18 hours	<i>Specify</i>
	8. Power	Built-in 49.9-watt-hour lithium-polymer battery, 30W USB-C Power Adapter	<i>Specify</i>
	9. Charging and expansion	Two Thunderbolt / USB 4 ports with support for: charging, display port, Thunderbolt 3 (up to 40Gb/s), USB 4 (up to 40Gb/s), USB 3.1 Gen 2 (up to 10Gb/s), 3.5 mm headphone jack	<i>Specify</i>
	10. Keyboard and trackpad	Backlit Magic Keyboard with: <ul style="list-style-type: none"> a) 78 (U.S.) or 79 (ISO) keys including 12 function keys and 4 arrow keys in an inverted-T arrangement, b) Ambient light sensor, c) Force Touch trackpad for precise cursor control and pressure-sensing capabilities; enables Force clicks, accelerators, pressure-sensitive drawing, and Multi-Touch gestures 	<i>Specify</i>

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TITLE:
**HYDRAULIC PULLER
 TENSIONER STRINGING
 EQUIPMENT**
— SPECIFICATION

Doc. No. KP1/13D/4/1/TSP/09/118
Issue No. 1
Rev. No. 0
Date of Issue 2023-02-13
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Clause number	Details and KPLC requirement		Bidder's offer (indicate full details)
11. Wireless	a) Wifi: 802.11ax Wi-Fi 6 wireless networking IEEE 802.11a/b/g/n/ac compatible	b) Bluetooth: Bluetooth 5.0 wireless technology	<i>Specify</i>
12. Camera	720p FaceTime HD camera, advanced image signal processor with computational video		<i>Specify</i>
13. Audio	a) Stereo speakers b) Wide stereo sound c) Support for Dolby Atmos playback d) Three-mic array with directional beamforming e) 3.5 mm headphone jack		<i>Specify</i>
14. Operating requirements	a) Line voltage: 100V to 240V AC b) Frequency: 50Hz to 60Hz c) Operating temperature: 50° to 95° F (10° to 35° C) d) Storage temperature: -13° to 113° F (-25° to 45° C) e) Relative humidity: 0% to 90% noncondensing f) Operating altitude: tested up to 10,000 feet g) Maximum storage altitude: 15,000 feet h) Maximum shipping altitude: 35,000 feet		<i>Specify</i>
15. Size and weight	a) Height: 0.16–0.63 inch (0.41–1.61 cm) b) Width: 11.97 inches (30.41 cm) c) Depth: 8.36 inches (21.24 cm) d) Weight: 2.8 pounds (1.29 kg)		<i>Specify</i>
B. Two Way Radio			
1. General	Rugged for outdoor use and robust.		<i>Specify</i>
2. Channels	16 minimum		<i>Specify</i>
3. Coverage	Up to 9kms line of sight		<i>Specify</i>

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Clause number	Details and KPLC requirement	Bidder's offer (indicate full details)
	4. Privacy codes	Over 200 codes
	5. Dimensions	No larger than 120x60x40
	6. Weight	275 grams maximum
	7. Sealing	IP55
	8. Dust and Humidity	EIA 603
	9. Shock Vibration	Polycarbonate Housing passes EIA 603
	10. Average battery life	Up to 20Hrs with battery save on
	11. Storage	Carry Holster with swivel belt clip
	12. Charger	Stand-alone Charging station for easy operation
5.	Test Requirements. Responsibility of carrying out tests	Specify
6	Marking and Packing	
6.1	Marking	Specify
6.2	Packing	Specify
	APPENDICES	
A	Test and inspection	
A.1	Copies of Type Test Reports submitted with tender	Provide
A.2	Acceptance tests at the manufacturers works	State compliance
A.3	Inspection at the stores and replacement of rejected items	State compliance
B	Quality Management System	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2015 Certificate	Provide
C	Documentation	
C.1	Documents submitted with tender	State compliance
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	State compliance
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

** Words like 'agreed', 'confirmed', 'As per KPLC specifications', etc. shall not be accepted and shall be considered non-responsive.*

.....
Manufacturer's Name, Signature, Stamp and Date

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