
Guideline for spinning process

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Textile yarns (TC 68) and published by the Ethiopian Standards Agency (ESA).

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Guideline for spinning process

1. Scope:

This Ethiopian standard specifies the general guideline for spinning process which deals with guideline for production, quality and maintenance.

This standard does not include other spinning technology such as air jet spinning, friction spinning and vortex spinning.

2. Normative reference

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

ES 6265 -Terminology Relating to Textiles

ES 6289 - Standard Terminology for Yarn Spinning Systems

ES 6678 Guideline for Bale Management system

ES ISO 5234 -Textile Machinery and Accessories- Metallic Card Clothing-Definition of Dimensions, Types and Mounting

ES ISO 26243 Cards for Staple Fibers Spinning — Vocabulary and Principles Of Construction

ES ISO 9947 Textile Machinery and Accessories — Two-For-One Twisters — Vocabulary

ES ISO 4105 Textile Machinery and Accessories - Wires For Flexible Card Clothing

3. Terms and definition

For the purpose of this standard the definition ES 6289 and the following definitions shall apply

3.1.

Maintenance planning

Maintenance planning is the maintenance management activity that is carried out to prepare the maintenance plan. It consists of a “structured set of tasks that include activities, procedures, resources and the time scale required to carry out maintenance”.

3.2.

Maintenance scheduling

Maintenance scheduling is a process in which different maintenance tasks or activities are assigned to resources and then placed within certain time windows in order to be accomplished (Annex A).

3.3.

Machine auditing

Systematic and documented process for obtaining audit evidence about the status of machines and evaluating it objectively to determine the extent to which the audit criteria set in the audit checklist (Annex C) fulfilled.

3.4.

Raw material store

a place where raw materials are kept for future use.

3.5.

blow room

A sequence of different machines arranged in a line where the supplied compressed bale is converted into a uniform lap/chute by opening, cleaning and mixing or blending.

3.6.

draw frame

A machine that parallelize and straighten the fibers in card sliver along the sliver axis to improve the regularity in linear density of card sliver by doubling and drafting.

3.7.

lap former

a machine that converts draw frame slivers in the form of lap suitable for subsequent process.

3.8.

roving frame

a machine that converts draw frame sliver (produced from carded or combed sliver) in to low twist lea called roving by drafting, slightly twisting, and winding onto a removable bobbin.

3.9.

waste

Reusable wastes such as sliver, lap bits, roving ends and pneumatic waste and non reusable wastes such as yarn wastes generated from each sections and/or machines during yarn manufacturing process.

3.10.

transfer Voucher

Used to record materials (raw material or process wastes) as documented evidence when received and transferred.

4. GUIDELINE FOR PRODUCTION AND QUALITY

4.1. General guidelines for quality and production

- Spin plan should be prepared and machineries to be balanced based on the actual conditions and spinning machines to be allotted to achieve the target.
- Minimum stock of raw material should be maintained based on the annual plan prepared accordingly the management should be proactive to deliver it on time.
- Actual yarn realization should be calculated at least monthly based on the available data and should be compared with the estimation and standard.
- There should be a system for continuously monitoring the individual operator's output and efficiency periodically and the low efficiency operators should be re-trained.
- System should be in place and respective personnel should be trained to perform different trials for process optimization which can improve the quality and productivity performance of the factory.
- Necessary waste bins should be provided for collection of waste to make the department housekeeping neatly.
- Work-in-process materials and finished goods should be covered to avoid fluff accumulation.
- Awareness and refreshment training should be given to employees.
- The required temperature and humidity should be maintained throughout the production process.

- Machine break downs should be recorded for analyzing and corrective and preventive actions should be taken.
- Standard operating procedures (SOP) or work instructions should be given to operators and carried out the work as specified and should be monitored accordingly.
- Management information system related to activities such as labor, machinery status, raw material, production, etc. should be checked according to the quality and production plan.
- Proper firefighting system should be installed, especially for the raw material store and awareness should be created on fire hazard and its preventive measures to all employees who all are working in the industry from top management to floor level workers.
- Appropriate and sufficient personal protective equipments (PPE) should be provided to all relevant sections as necessary to protect the operator from the occurrence or risk of injury or loss at work place.
- Quality plan should be developed in order to achieve goals of meeting customer requirements in time, within the available resources.
- Operators should be aware and trained for better cleaning of machineries.

4.2. Process based guidelines for quality and production

4.2.1. Raw material store

- The stock lots (bin cards) should have a display of details with quantity.
- Process waste from each sections and machines transferred to the waste baling or raw material store should be separated and the waste bales should be marked with Lot No / variety when packed with proper identification.
- Process wastes should be transferring with Transfer Voucher and the actual waste received by the cotton store should be tallied.
- Good house keeping should be maintained.
- Floor space should be marked with yellow lines and lots should be stored within the lines to avoid mix-up and easy quantification.
- Main raw material store should be free from grease, hazardous chemicals fuel etc.
- Enough space should be allocated or separate waste store should be established for storage of wastes.

4.2.2. Blow room

- Depending on the subsequent process requirements bale mixing and lay down pattern should maintain with the lowest possible variation in raw material parameters according to ES 6678.
- During bale plucking process, bales should be run out to minimum depth possible and the remaining bales should be stuffed in between bales as like usable waste.
- Additional operators may be engaged to pick the visible contaminations and heavy materials moving behind the take off unit to reduce multiple contaminations.
- System should be implemented to frequently check the efficiency of contamination clearing machine and removed contaminate should be sorted, weighed and recorded for corrective action.

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- Separate waste study should be carried out and machine settings need to be change for better yarn realization if it is necessary.
- The usable waste generation and consumption should be monitored.
- Quality control should have system to monitor the fiber rupture, nep generation and cleaning efficiency according to the defined quality plan for effective usage of the raw material and quality.

4.2.3. Carding

- Machine setting and process parameters should be uniform among carding machine for the same mixing and count.
- Waste study should be conducted and carding machine settings should be optimized to reduce lint loss.
- Cans from each card machine should be identified separately to enable channel feeding for easy traceability
- The carding production should be monitored machine and shift wise to avoid back process shortage
- Shift and machine wise sliver waste should be weighed and recorded for corrective action.
- Quality control should have system to monitor the fiber rupture, nep removal efficiency and cleaning efficiency according to the defined quality plan for effective usage of the raw material and quality.
- The breakage rate should be monitored.

4.2.4. Draw frame

- There should be a system in place for count, evenness, and A% checking according to the defined quality plan.
- Calibration of Auto levelers should be done at least once in a month for achieving better quality.
- The quality department should incite for calibration of Auto leveler when A% is below and above the standard.
- Top rolls should be interchanged at fixed intervals for uniform worn out and the strippers should be cleaned for consistent quality and avoid chocking. All operators should be instructed to follow this practice.
- Cans from each drawing machine should be identified separately to enable channel feeding for easy traceability
- There should be a system for waste evacuation and their disposal.
- The breakage rate should be monitored.

4.2.5. Lap former and Comber section

- Selection of process parameters, viz. hank of feeding lap, type of half-laps, speeds, settings, drafts and delivery hank, percentage of noil to be extracted, type of feed to be employed, length of feed per nip, maximum fiber length accepted in noil, etc. should be done according to the production and quality requirement.
- Cans from each machine should be identified separately to enable channel feeding for easy traceability
- There should be a system for waste evacuation and their disposal.

- The following Performance related points should be checked:
 - o Lap weight(g/m)
 - o Noil % extracted
 - o Count of sliver
 - o Nep removal efficiency

4.2.6. Roving frame

- Count Board identification system should be followed for to avoid count mix-up and better control of process.
- Channel feed system should be followed for consistent quality and easy traceability of the process.
- All indication lamps should be glow for better efficiency of operators.
- Top roll should be with proper clearer for better removing of micro dust which results better quality.
- All Top arms should have uniform pressure and condensers should be maintained uniform for the same count.
- Idle spindle should be maintained as much as possible to zero.
- Batch feeding should be followed to avoid one-time exhaustion of feed cans and improve the machine efficiency
- Quality control should have system to monitor the breakage rate, roving unevenness according to the defined quality plan for effective usage of the raw material and quality.

4.2.7. Ring frame

- Channel feed should be followed for better traceability of process
- Count Board should have the mentioned details prominently for to monitor everybody which results better control over machine & process.
- Snap survey should be taken for idle spindle, end breaks, waste removal etc. to improve performance, production and quality.
- Full cop diameter should be maintained for maximum content and for improved utilization
- Spacer should be use as per recommendation and it should be uniform for the same count.
- Main draft should be uniform for the same count to maintain good count CV%
- Drafting pressure should be in OFF position while the Ring frame is kept idle for long duration.
- Quality control should have system to monitor the breakage rate, yarn hairiness, U%, imperfections, CV%, yarn strength and TPI according to the defined quality plan for effective usage of the raw material and quality.

4.2.8. Open end

- Count board identification should be given for better process control
- Channel feed system should be followed for easy traceability.
- Rotor diameter should be uniform for the same count for consistent quality.
- The cone conveyor should be kept clean as the doffed cones were in touch with the belt surface.
- Necessary waste bins should be provided for collection of waste to make the department housekeeping well-ordered.
- Opening roller speed should be uniform for the same mixing and count.

- Cheese/Cone weight should be maintained uniform
- Quality control should have system to monitor the breakage rate, yarn hairiness, U%, imperfections, CV%, yarn strength and TPI according to the defined quality plan for effective usage of the raw material and quality.

4.2.9. Winding (Autoconer)

- Cone weight should be maintained within acceptable variation
- Yarn faults should be monitored according to the quality plan to control the process
- Splice strength should be checked and maintained within standard to reduce splice slip pages in the down stream process
- Yarn clearer setting should be done depending on the yarn quality requirement.
- Hard waste generation should be controlled to avoid economic loss.
- The empty ring tube collection baskets should provide with castors for easy transportation of spinning empties to ring frame department and avoids wastage of time of ring frame doffers and improves ring frame utilization and production.
- Empty tube conveyor should be without damage to reduce unwanted hard waste and proper transferring of empty tubes.
- The cone conveyor should be kept clean as the doffed cones were in touch with the belt surface.
- Quality control should have system to monitor the breakage rate, splice strength, and objectionable faults according to the defined quality plan for effective usage of the raw material and quality.
- Defective cones should be identified with the drum numbers and recorded to take corrective action.
- To reduce the hard waste (yarn) ruminant on baby cops assessed for the root cause in the back process.
- Operators should not use sharp knives/hooks to remove remnant yarn from baby cops in order to reduce break ages and improve ring frame utilization and production.

4.2.10. Yarn Conditioning

- The optimum pressure and temperature should be maintained
- The process parameters such as weight gain, moisture gain, improved strength and elongation should be checked according to the quality plan.
- After yarn conditioning the cones / cheeses should be let in open air for half an hour and after that Operator should cover the cones / cheeses individually by using polythene cover.

4.2.11. Doubling and Twister

- Identification should be given for better control of process to avoid mix up.
- All stop motion has to function properly.
- Wastage of yarn should be avoided and proper system to clear the remnants daily.
- Control of process parameters should be effective.
- Capsule tension should be kept uniform among spindles for the same count.
- Pot and separators should be cleaned during cheese change to avoid fluff getting in to the twisted yarn.

4.2.12. Reeling

- Cleaning should be done frequently.
- Operator efficiency should be monitored.

4.2.13. Product Packaging

- The labeling on the product package should be checked against the requirement.
- The weight, the number of cones and other packing specification should be followed and check by taking appropriate sampling.
- Weighing balance should be calibrated
- Package consumption should be measured and monitored

5. GUIDELINE FOR MAINTENANCE

5.1. General guidelines for machinery and equipment's maintenance

- Yearly preventive maintenance plan and schedule should be prepared for each machine considering the following main factors and has to be followed strictly: -
 - o Manufacturer's Recommendations.
 - o Quality level required.
 - o Condition of the Machines – Technology & Age
 - o Type of raw material used.
 - o Process parameters Maintained.
 - o Atmospheric conditions.
- Working procedures/standard operating procedures should be prepared for preventive maintenance, corrective maintenance, operator care and lubrication so as to have repeatable process, capture knowledge, train new employees, and reduce self-induced failures.
- Root cause analysis should be a common practice in the industry.
- Most of a maintenance personnel's time should be covered by a work order and their time should schedule.
- Minimum stock of critical spares should be identified and maintained based on the machinery manufacturer's recommendation and the factory's actual performance and experience for the sake of effectiveness the management should be proactive to deliver the spares in time.
- Basic setting of machineries should be checked and ensured periodically as per the schedules.
- Calibration should be done for major testing equipment's and machine at defined period of time.
- Machine history record card should be maintained for each and every machine.
- Machine audit should be done during schedule cleaning to keep up the machine for better quality and performance.
- Machineries should be prioritized according to equipment condition, consequence and risk to the business.
- Systems like Total Productive Maintenance (TPM) should be implemented.
- System should be in place and respective personnel should be trained to perform different trials for process optimization which can improve the quality and productivity performance of the factory.

- Consumable spares should be replaced in time as per manufacturer's recommendation and the factory's standard to avoid production loss.
- Locks should be provided and the machineries doors should be kept in locked condition for safety and good performance.
- Every break down, stoppage or Failure data should be record machine and reason wise for Failure Reporting, Analysis, Corrective Action System (**FRACAS**)
- System of periodical checking should be in place to functioning of photo cells, stop motions, door safety, metal detector, fire detectors and housekeeping.
- Rubber cots grinding schedule should be maintained uniform and according to predefined schedule to all relevant machines.
- Top rollers pressure should be checked and maintained uniform in respective machines.
- Operators should be trained to identify symptoms of equipment in distress, adverse conditions and the actions to minimize their effects, is essential to improving and sustaining asset reliability since operators are the first line of defense against the effects of unmitigated risk.
- Appropriate and sufficient personal protective equipment's (PPE) should be provided to all relevant sections as necessary to protect the operator from the occurrence or risk of injury or loss at work place.
- Castor wheels cleaning of cans should be done periodically for the smooth movement of materials and reduce fatigue on operators.
- Suitable lubricant recommended by the manufacturer should be selected and the frequency of applying should be review and optimize according to the existing situation of the company.
- Quality of compressed air and pressure gauge should be checked: -
 - o Air should be free from oil and moisture.
 - o Leakages in airline should be arrested.
 - o Calibration of pressure gauge should be done at fixed intervals with the use of master gauge.
 - o Functioning of electro valves should be checked.
- Generally, belts should be checked periodically for the following issues: -
 - o Proper tensioning of belts
 - o Free from oil/ fluffs
 - o Alignment of belts

5.2. Section based guidelines for machinery and equipment maintenance

5.2.1. Blow room

- All grid bars should be cleaned, polished, and set periodically.
- Beaters and spiked lattice should be checked periodically and corrective action to be taken.
- All the waste and material pipelines should be cleaned periodically to free from dust and dirt to maintain the uniform pressure.
- Mixer feed conveyor should run in center.
- Gear box maintenance to be carried out periodically to avoid worn out of gear wheels and shaft.
- The Pressure of Material, Waste and Micro Dust Pipe Lines should be checked and optimized using digital or manual monometer frequently

5.2.2. Carding

- The carding section should be clean every shift by operators and every week together with designated mechanics
- Licker-in, Cylinder, Dofter wires & Flat Tops needs to be replaced as per manufactures recommendation and the actual conditions. Periodical assessment of the wire condition should be ensured physically.
- Half setting and full setting should be done in carding as one integral part of inspection and small maintenance.
- The Pressure of Material, Waste and Micro Dust Pipe Lines should be checked and optimized using digital or manual monometer frequently

5.2.3. Draw frame

- Calibration of Auto levelers should be done at least once in a month for achieving better CV%.
- Top rolls should be interchanged at fixed intervals for uniform worn out and the strippers are cleaned for consistent quality and avoid chocking. All operators should be instructed to follow this practice.
- Bottom roller setting, Break drafting, etc should be done for every change in total mixing.
- Working of stop motion should be done periodically.
- Buffing schedule should be properly done to maintain consistent quality.

5.2.4. Lap former and Comber section

- Deciding and maintaining the schedules for preventive maintenance like half-lap mounting, setting, brush mounting, buffing, etc should be done.
- **The following machine related points has to checked in combing:**
 - o Condition of the machines, for example, gripping by nipper, surface of detaching rollers, pressure on detaching rollers and on drafting rollers, smoothness of sliver table, condition of trumpets.
 - o Working of stop motions.
 - o The surface of detaching rollers and drafting rollers.
- Gear box maintenance to be carried out periodically to avoid worn out of gear wheels and shaft.

5.2.5. Roving frame

- All indication lamps must glow for better efficiency of operators.
- All Top arms must have uniform pressure and condensers should be maintained uniform for the same count.
- Idle spindle should be maintained near to zero.
- All over head travelling cleaner should function always for better housekeeping of machines
- Bottom Roller settings should be uniform for the count/ Process during batch change.
- Condensers and spacers should be maintaining uniform for the same count.
- Buffing schedule should be properly done to maintain consistent quality.

5.2.6. Ring frame

- Traveler clearer setting and spindle centering should be done for better performance of the machine.

- Traveler should be changed according to the manufacturer recommendations and actual working condition.
- Roller setting should be maintained uniform by taking periodical setting to maintain consistent quality during batch change.
- Idle spindle should be less than or equal to 0.1%
- Full cop diameter should be maintained for maximum content and for improved utilization
- Spacer should be use as per recommendation and it should be uniform for the same count.
- Drafting pressure arm should be in OFF position while the Ring frame is kept idle for long duration.
- Top rolls should be checked periodically and damaged ones should be replaced.
- Buffing schedule to be properly done to maintain consistent quality.
- The functioning of travelling overhead cleaner should be maintained proper for keeping the machine clean.
- If the ring frame is equipped with auto doffing system, it should be checked frequently for its proper functioning.

5.2.7. Open end

- Opening rollers speed should be uniform for the same count.
- Opening rollers condition should be checked.
- Rotors should be replaced based on the manufacturer recommendation and/or actual working status
- Opening and rotor driving belts should be checked periodically
- Rotor be a ring lubrication schedule should be followed strictly as recommended by machinery manufacture.
- Insert technological air tubes should be cleaned with water and suitable solvents periodically.
- Idle rotor should be near to zero.
- The cone conveyor belt should be kept clean as the doffed cones were in touch with the belt surface.
- Cone holders setting to be done periodically to avoid bad shaped cone formation.

5.2.8. Winding (Autoconer)

- The Anti lapping drum system should be available in all drums to avoid lapping and drum damage.
- The tension disc should be serviced periodically to maintain uniform tension in the cone.
- Cone holders setting to be done periodically to avoid bad shaped cone formation.
- The cone conveyor belt should be kept clean as the doffed cones were in touch with the belt surface.
- The waxing system should be in working condition for knitting and hosiery yarn.
- Yarn clearer (USTER Quantum) should be calibrated periodically.
- The compressed air quality and quantity should be checked and monitored frequently.

5.2.9. Yarn Conditioning

- Temperature and pressure gauge should be checked.

5.2.10. Doubling and Twister

- Pig tail centering should be done periodically to control the balloon and tension.

- Drum setting should be done periodically to ensure free rotation of plastic cones and uniform application of twist.
- The alignment between Pre-Take-up tensions rolls and pig tail to be done periodically to avoid unwanted rubbing of yarn and increase in imperfections.
- Stop motion should be carried out periodically for Package lifting
- Yarn reserve should be checked during process change and every month to maintain the standard for uniform twist application.
- The length measuring effectiveness should be checked for accuracy periodically for maintaining the uniform length in the double yarn.
- Cheese holder setting should be carried out periodically for smooth unwinding of the parallel yarn during twisting.

5.2.11. Reeling

- Cleaning should be done frequently.

ANNEX A: Sample Maintenance Schedule for Carding Section

Maintenance Schedule for - CARDING		
1	Routine cleaning with compressed air (@ 4-4.5kg/cm ²)	Shift wise
2	Flat stripping fillet cleaning	Daily
3	Flat cleaning with Compressed Air or special fillet hand cleaner	Weekly
4	Opening and cleaning of all parts and visual checking	Weekly
5	Deflection roller of flats	2 Week
6	Flat belt, Timing belt, V belt, Chains, Gears cleaning and checking	2 week
7	Coiler Tube cleaning with soap water (Monthly once by Brasso)	2 week
8	CCD, CFD/ ICFD, T&G calendar roll cleaning	2 week
9	Half Setting at Licker in Zone	3 Month
10	Chain, Gear wheels, Oiling / Greasing	2 Month
11	Flat gear Oil level checking and topping	2 Month
12	Full Setting	4 Months
13	Can changing Mechanism checking	6 Months
14	CFD/ICFDD, CCD Opening cleaning and re-calibration	6 Months
15	Stripper roll, Squeeze roll, Calender roll, Flats cleaning roll, Stripper roll greasing	6 Months
16	Coiler plate drive opening cleaning, Coiler bearing greasing and servicing **	9 Months
17	Licker-in, Cylinder and Doffer Bearing greasing	1 Year
18	Coiler Gear box, Flat Gear box Oil changing	1 Year
19	All drive motor to check and Lubricating with New Grease	1.5 Year
20	Full Overhauling	During wire change

Annex B: Machine History Template

Location:		Machine name:		Manufacturer:		Machine No: 1		Owner:	
Model:			Country of origin:		Manufactured year:		Date of commissioning:		
Manufacturer address:						Place:			
						Length, width and height:			
Major Replacement on the Machine									
Date	Part Number	Spare Part Used	QTY	Price	Maintenance Done	Type of Maintenance	Engaged Technician	Maintenance Cost	signature

Annex C: Sample Machine Audit Checklist for Carding Section

FeedBatWeight		MachineNo.		
DeliveryHank		Sch. Cleaning Doneon		
CardProductionkg/hr		Half SettingDoneon		
CylinderSpeed(rpm)		Full Setting Doneon		
Lickerin Speed(rpm)		DofferStripping Doneon		
FlatsSpeed(rpm)		FlatsStripping Doneon		
		Grading		Remarks
S.No	Condition of Components	Good	Poor	
1	Chute Door Locking			
2	Chute Round Plastic door scondition			
3	Chute Opening Roller Drive Belt condition			
4	Chute Delivery Rollers Drive belt condition			
5	Feed Trough cleanliness			
6	Feed Roller Drive Belt condition			
7	Lickerin Drive Belt condition			
8	Cylinder Drive Beltcondition			
9	Cylinder Drive BeltGuide Pulleys condition			
10	Flats Wire Loading			
11	Flats Cleaning Brush condition			
12	Flats Cleaning Combcondition			
13	FlatsTransportBelts-Both Sides			
14	FlatsTransport Belts GuidePieces			
15	Flats Drive Perlon Rope condition			
16	Flat ClgBrush Drive Belt condition			
17	Flats Cleaning Plastic Covers			
18	Doffer Wire Loading			
19	Doffer Cover&side Metal Cover condition			
20	Doffer Drive Beltcondition			
21	Take Off Roller Cleaning Brush condition			
22	Delivery Rollers condition			
23	Delivery Rollers Drive Beltcondition			
24	Top Scraper Blades condition			
25	Bottom Scraper Bladecondition			
26	Apron Doff drivebelt condition			
27	Cross Aprons condition			
28	Delivery Discondition			
29	TableTrumpet condition			
30	TableTrumpet Holder condition			
31	All SideDoors Locking condition			

		Grading		Remarks
S.No	Condition of Components	Good	Poor	
32	Panel Board Cleanliness			
33	Operator Interface Panel condition			
34	Signal Lamps			
35	Auto Leveler- Feeding whether ON/ OFF			
36	Auto Leveler-Delivery whether ON/ OFF			
37	Auto Air Cleaning –AL Delivery function			
38	Auto Air Cleaning –Waste Suction Pipes function			
39	Door Safety Limit Switches functioning			
40	ByPass Switch functioning			
41	Waste Suction Pipes & Hoses condition			
42	Waste Suction Pipes Rubber Joints condition			
43	Waste Suction functioning			
44	Air Leakage if any			
45	Cylinder Brake functioning & condition			
Observed By:		Process Owner		
Rechecked on and Remarks:				
Corrections Done By:		Process Owner		

Annex D: Sample Quality Plan

Department	Parameters	Frequency	Instruments used	Sample size	Minimum Requirement
Raw material	Length (2.5% staple length)	Whenever	Fiber testing Instrument	10% of bales in a lot	27+ mm for 20-24sNe and 29+mm for 30sNe
	Uniformity ratio	lot received	Fiber testing Instrument		5% for 20-24sNe and 48% for 30sNe
	Strength		Fiber testing Instrument		6-28g/tex for 20-4sNe & 28-30g/tex for 30sNe
	Mic		Fiber testing Instrument		4.3 for 20-24sNe and 3.8 - 4.0 for 30sNe
	Maturity Index		Fiber testing Instrument		>.90
	SFI		Fiber testing Instrument		6% -9%
	Rd		Fiber testing Instrument		70-80
	+b		Fiber testing Instrument		6 to 9
	Neps		Nep assessment Equipment		100-120
	Trash		Trash analyser		3-4%
	Moisture		Moisture tester		6-8%
Blow room	Nep increase %	15 days	Nep assessment Equipment	5 readings per position	00% increase is permissible
	Cleaning efficiency%	15 days	Trash analyzer	2 readings per position	50-55 %
	Fibre rupture	30 days	Fiber testing Instrument	5 readings per position	Less than 4%
	Waste%	30 days	Weighing method	Half hr duration	0X trash in cotton as in mixing trash
Carding	Nep removal efficiency	30 days	Nep assessment Equipment	5 readings per position	80-85 %
	Cleaning efficiency%	30 days	Trash analyzer	2 readings per position	Minimum 90 and upto card 98-99%
	Hank Checking	10 days	Cut & weighing method	10 reading X5 mtr / card	Mill std +/-5%
	Waste%	30 days	Weighing method	One can production	Mill Std +/- 0.5 (STD 5%-7%)
Comber lap former	Gms / mtr CV %	15 days	Cut & weighing method	10 reading X 1 mtr / machine	Less than 1 (STD 60 - 70 grams/ mt)
Comber	Noils %	15 days	Weighing method	Two Occ / m/c	Mill Std +/- 0.5 (STD 15-18%)
	Sliver U%	15 days	Evenness Testers	10 reading X 50 m/min per m/c	Max Mill Std + 1 (STD 4-5%)
	Nep reduction %	30 days	Nep assessment Equipment	5 Readings/ m/c	Minimum 60-70
Draw frame	Sliver U%	Daily	Evenness Testers	10 reading X 50 m/min per m/c	Max Mill Std + 0.5 (STD Br 3.0 finisher 2.5)
	A%	30 days	Cut & weighing method	10 readings X 5 mtr with N,N+1,N-1 ends	+ /- 0.5
	One mtr CV%	15 days	Cut & weighing method	30 readings X 1 mtr per m/c	Maximum 0.5
	Hank Checking	Two times	Cut & weighing method	6 reading X5 mtr / m/c	Mill std +/- 0.02
Speed frame	Roving U%	15 days	Evenness Testers	10 reading X 50 m/min per m/c	Max Mill Std + 1 (STD 3.5 - 4.5%)
	Hank CV%	30 days	Cut & weighing method	10 reading X 15 mtr / m/c	Less than 1
	Stretch %	30 days	Cut & weighing method	30 reading X 15 mtr / m/c	Less than 1
Ring frame, Open end and	Count and CV%	7 days	Cut & weighing method	Minimum 20 reading x 100 mtr count	Less than 1.5

Department	Parameters	Frequency	Instruments used	Sample size	Minimum Requirement
Autoconer	U% & imperfections	7 days	Evenness Testers	10 readings X 400 m/min / m/c	Mill std +/- 10% STER 50% level
	Classmate results	10 days	Yarn Fault Tester	500 KM observation	Mill std +/- 10% STER 50% level
	RKM	7 days	Strength Tester	100 reading / cop X 10 cops	Mill std +/- 10% STER 50% level
Draw frame, comber, speed frame and Ring frame	Breakages study	Once a month	Observation	2 hrs study	Less than or equal to Mill std
Autoconer	Setting checking	Daily	Observation	All machines	Same as Mill std
	Clearer cuts	Daily	Observation	All machines	Max Mill std + 10%
	Splice strength checking	Once in 10 days	Splice strength tester	5 readings before and after splice	Minimum 80% yarn strength
	Cone checking	Daily one d off	Observation	All cones	Less than 5

OUTGOING YARN CHECKING

	Parameters	Frequency	Instruments used	Sample size	Standard
	Bag weight (Gross & Tare weight)	Once in 10 days	Observation	One bag	Mill standard
	Visual inspection		Observation	All cones from 1 bag	Nil defect
	Cone weight		Observation	All cones from 1 bag	Mill standard
	Count and Count CV%		Balance	One reading per cone X 20 cones	Less than 1.5
	Strength and RKM		Strength Tester	100 reading /cone X 20 cones	Mill std +/- 10%
	U% and imperfection		Evenness Testers	One reading per cone X 20 cones	Mill std +/- 10%
	Hairiness		UT4 / UT5	One reading per cone X 20 cones	Mill std +/- 10%
	Moisture		Moisture meter	One reading per cone X 20 cones	Mill std +/- 10% (STD 7-8%)

Note:

The above quality plan is subject to change depending upon the requirement of individual mill based on their machine condition and quality requirement.

Annex-E: Quantitative guide line for spinning process

SN	Deliverable Parameters	Unit of Measure	IBM	Factory Status
Blow room				
1	Temperature	0C	27-30	
2	Relative Humidity	%	50-55	
3	Efficiency	%	70-75	
4	Production	KG/Line/shift	1500kg/shift	
5	Blow room dropping	%	4	
6	Cleaning efficiency of Blow room	%	55-65	
7	Sweeping waste	%	1	
8	Invisible loss & gutter loss	%	1.0	
9	Fire sensors & metal detectors checking	Weekly	weekly	
10	Vision shield checking	Daily	Daily	
11	Bale Management System	Daily	All bales	
Carding				
12	Temp	0C	30-31	
13	Relative Humidity	%	50-55	
14	Efficiency	%	88-93	
15	Prod/card/shift	Kg/shift	480	
16	Waste extracted at card	%	4-6	
17	Card sliver trash	%	0.15-0.5	
18	Card sliver Unevenness	%	3.5 3.0	
19	Trash in card sliver	%	0.15-0.5	
20	Card cleaning efficiency	%	93-95	
21	Combined cleaning efficiency	%	95-98	
22	NRE of card	%	75-80	
Combing				
23	Combing efficiency	%	88-90	
24	Prod/comber/shift	Kg/shift	250	
25	ComberNoil	%	16-18	
26	Usable waste at comber preparatory & comber	%	1	
27	Comber sliver un evenness	%	3.5	
28	Comber Neps removal Efficiency	%	65-70	
Draw frame				
29	Lap former efficiency	%	70-75	
30	Breaker draw frame Prod/Delivery/shift	KG	1275 (0.100 HK DRG)	
31	Efficiency of Br Drg	%	75-80	
32	Br Drg sliver Unevenness	%	2.5-3.0	
33	Fr drg Prod/Deli/shift	kg	1250(0.100 HK)	
34	Efficiency at Fr Drg	%	80-85	
35	Fr Drg Unevenness	%	2.0	
36	Sliver waste	%	0.5	
Roving				
37	Production/ spindle /shift	kg	4kg/(HK rov 1.00)	
38	Roving frame Efficiency	%	80-85	
39	Roving Unevenness	%	4. for carded 3.5 for combed	
40	Speed frame end breakages	%	4%	
41	Roving waste	%	0.3	
Ring Spinning				
42	Temperature	0 c	27-32	
43	RH	%	45-50	

SN	Deliverable Parameters	Unit of Measure	IBM	Factory Status
44	Yarn Unevenness	%	20sKH=9.44 30s KH=10.24 40sKH=11.04 20sCH=7.84 30s CH=8.64 40sCH=9.36	
45	Ring Production	Gms/spindle/shift	20s=250 30s=170 40s=120	
46	Maintenance loss	%	2.0	
47	Idle Spindle	%	0.1	
48	Loss due to Doffing	%	0.9	
49	Yarn contraction for Twist Multiplier	%	3.4	
50	Pneumafil & Roller bonda	%	2.5	
51	Yarn Realization	%	Carded= 87.5 Combed=71-73	
52	Ring frame utilization	%	97	
53	Ring Frame Production Efficiency	%	88-93	
Rotor Spinning				
54	Rotor Spinning Prod Efficiency	%	92-95	
55	Rotor Utilization	%	98	
	YARN REALISATION		87	
56	Rotor prod in kg/Rotor/Shift	%	20s=1.70 16= 2.38 10= 3.90 7S/1=4.5	
57	Auto Coner Efficiency	%	70-75	
58	Auto Coner Prod in kg/Drum/ Shift	kg	20s=12 30s=9.2 40s=7	
59	Blow Room	Lines/Tenter	2 lines/tenter	
60	Carding	Card/Tenter	12	
61	Drawing	Deliveris/Tenter	6	
62	Speed Frame	Machines/ Tenter	2	
62	Ring Frame	Spindles/Sider	2400	
63	Ring Doffer	Spindles/Doffer	5000	
64	Comber	Combers/Tenter	8	
65	Open End Spinning	Rotors/Tenter	360	
66	Winding	Drums/ Tenter	40	
67	Raw Materials cost	%	56.2	
68	Salaries & wages	%	6.5	
69	Stores including packing materials	%	4.3	
70	Power	%	3.5	
71	Selling& distribution	%	3	
72	Interest	%	12.2	
73	Depreciation	%	10	
74	Overhead & Administration	%	4.9	
75	Profit& loss		(--)0.66	
76	Production Lead Time	Days	7	

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DRAFT DOCUMENT

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

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- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services are in compliance with the required standards,
- ❖ Facilitate the country's technology transfer through the use of standards,
- ❖ Develop national standards for local products and services so as to make them competitive in the international market.

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