

TÉCNICA DEL NORTE UNIVERSITY

FACULTY OF APPLIED SCIENCE ENGINEERING
TEXTILE ENGINEERING CAREER

MANUAL FOR THE PRODUCTION OF HIGH TENACITY YARNS
BONDED FOR INDUSTRIAL USE



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INTRODUCTION

This technical manual compiles the stages for the production of high tenacity yarn bonding for industrial uses, which are closely related with the textile sector and have an important role at the using time in the assembly and manufacture of clothing accessories such as it is footwear.

Nylon 6.6 is used as raw material of high tenacity fed from bobbins to split and feed the first step of twisted and gathered. Later there will be a second step the number of strands twisted in the first twisted assembly.

Generally, these yarns are sold by color so it is dyed, then give a final bonding and lubrication to finally fester in its final presentation and proceed to its commercialization.

There is not enough information or literature on this topic in libraries neither on the Internet so it took a thorough and exhaustive investigation with the same suppliers and representatives of brands on the market. The experimental "test - error" and a detailed analysis, were very important tools in the development of this product.

Indicated below is a reference guide developed in the company ENKADOR S.A. for this reason the results of this work will be for the exclusive use of it.

1. RAW MATERIAL

The nylon 6.6 (6.0 - 9.5 g / den) raw material of high tenacity, which has a high durability and it is generally used in seat belts, tire cord, nets, parachutes, stitching wire for rigid materials and so on. Regular tenacity fibers (3.0 - 6.0 g / den) are used in clothing. In addition to high tensile strength and abrasion resistance (100%). The nylon carpet fibers outperform all others. No one has been able to compete with nylon hosiery. Nylon has other uses such as tents, sails for boats and storage tanks.

The bobbins are analyzed in the laboratory to determine if their physical properties are consistent with the process of manufacture of these threads.

The variables studied are:

- Fiber type
- Title
- Tenacity
- Elongation
- Melting point
- Shrinkage
- Physical defects
- Liveliness
- Lubricant

The results obtained are compared with the data sheet provided by the supplier of the raw material.

2. ENCOPSADO

The encopsado is a process of change in presentation to feed twisting machines. Facilitate training for its winding symmetrical, the decrease of the ball and fractionation according to standard weight warping.

A proper encopsado must ensure that the edges or flanks are handled properly to avoid damage to the coils which are irreversible.



Figure: Encopsadora machine

2.1 STANDARDS ENCOPSADO QUALITY

- Start the encopsadora machine ensuring the correct threading the thread through all the elements that must be in contact with it.
- When handling the cops, the thread should not be touch with a hand on the upper or lower training to prevent slippage of coils.
- Clear guidelines on the placement of coils cop to avoid cops spotted.
- Comply with the registration of product separation and identification of non-equal length.
- In case of thread breakage, do not set the hook on a cop to burst.
- Conduct physical defects control on all first silent, and identify locations with defects.

- Moving with the utmost care and place in cars cops carrying to hand twisted.

CONDICIÓN PARA LA MÁQUINA ENCOPSADORA			
Fecha: 01/05/2011			
Producto: Nylon 6.6 alta tenacidad			
Procedencia: FOY importado			
Núcleo: Cop metálico			
Color núcleo: plomo			
Instrucciones:			
1. Colocar el tubo cop en la posición y posteriormente enrollar el hilo para evitar enredos en el huso.			
2. Bajar la bancada antes de realizar la carga o muda para evitar descalibración.			
3. Colocar en el computador de la máquina los parámetros de trabajo.			
VARIABLES GENERALES	Unidad	Parámetro	Desviación
DENIER NOMINAL/FILAMENTOS	denier	210F34	
CODIGO AFINIDAD	-	5525	
PESO DE LA UNIDAD	Kg	9	
NUCLEO ALIMENTADO	Tipo	BOBINA	
VARIABLES ENCOPSADO	Unidad	Parámetro	Desviación
HILOS ENSAMBLADOS	No.	1	
NUMERO DE MUDAS	#	6	
PESO DE LA UNIDAD	Kg	1.5	
LONGITUD PRIMERA MUDA	m	64286	500
LONGITUD ULTIMA MUDA	m	64286	500
TIEMPO DE FORMACION UNIDAD	min	98,9	1
NUMERO DE PROGRAMA	-	3	
TIPO DE FORMACIÓN	-	COP SIMÉTRICO	
INICIO	mm	17	
S / Z	-	Z	
DIAMETRO VACIO	mm	50	
DIAMETRO LLENO	mm	130	5
RESERVA	seg	0	
VELOCIDAD DE HUSOS	m/min	650	5
PASSO	-	B	
ALTURA DE BOBINADO	mm	380	2
SELECTOR DE TENSIÓN	No.	7	
CONTROL DE CONDICIONES	Unidad	Parámetro	Desviación
TENSION DE BOBINADO	cN	65	3
CONTROL DE LABORATORIO	Unidad	Parámetro	Desviación
Titulo	denier	213	3
Tenacidad	g/denier	8,2	0,5
Elongación	%	19	3
HI-190 c	%	4,5	1
Loops	N/100m	0	0,2
Filamentos rotos	N/100m	0	0,2
Vividez por metro	v v / m	10	3
Dureza	Shore	80	3
Paros por Devanado	# paro / kg	0	0
Aceite	%	0,6	0,3
Diámetro máximo	mm	130	
Peso	g	1510	10

3. TWISTED

Twist is the process by which one, two or more plies get a certain amount of turns on its axis.

Then the twisted filaments are placed in the form of an upward spiral in the beam of a thread. For the way we see that a single filament at a given time is on the outside and another time is inside the beam.

- The most important reason to twist the wires is due to the protection given torque to the filament to increase cohesion between them. Besides twisting serves to mask to some extent the presence of small physical defects.
- Within certain limits the torque increases yarn strength.
- Through the torsion wire can be given to certain properties, mainly in volume and elongation.
- As a result of the torque can be given a special appearance to the thread.



Figure: Olla, spindle, twisting machine tensioner assembly

Due to this thread is cabled and consists of 2 or 3 ply, are required 2 steps of twist.

- The first step is to give each individual twist out while assembling or get together.
- The second step is to give final twist to the ends twisted and assembled previously.



Figure: Machine for twisting first step



Figure: Machine twisted second step

In the case of composed yarns.

a) Re-twist a two-ply yarn

- Re-twist in the opposite direction to the twisting of the wire components. This is the most used because it achieves the best balance between the wire twisting torque components and the resulting compound or thread..
- Re-twist in the same direction of twist of the yarn components. Returns a string with two ends, whit a very dry tact, very little elasticity and tendency to curl on itself.
- In the case of two threads that have been twisted in the opposite direction to each other and now are twisted together in that one. The result is that the thread is hidden torsion which was done in the same sense as re-twist (S) and the other wire is stretched and waves on the last.

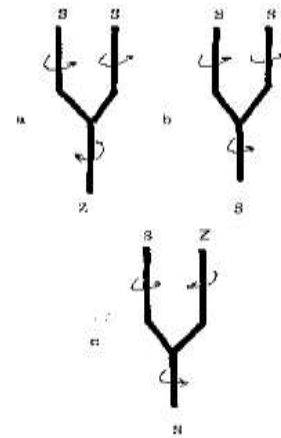


Figure: Twisted of composed yarn of two strands

b) Twisted three-strand wire

Thread # 1: Strand (a) of torque Z
 Strand (b) of torque S
 The twisted Z is indicated with 700 t.p.m.

Thread # 2: Strand (c) of torque Z
 FINAL TWISTED: Sense of S of 300 tpm
 (300 twists per meter)

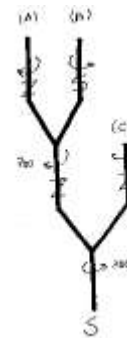


Figure: Twisted of composed yarn of three strands

3.1 STANDARDS TWISTED QUALITY

- When loading machines, flat wire (cops), proper handling to prevent damage to the angle of training.
- Previously we clean the tensioner assembly. (Depending on state)
- After charging, so that packets are not spinning and staining immediately decouple from the V4.
- Every fed cop should have their identification ring, if you do not have it you have to check the product in the laboratory.

- Before loading the machine, visually inspect physical or defective conditions of the supplied units, defective units apart.
- After starting the whole machine Ratti, the quality control operator must monitor and ensure proper threading, queues of change, able to speed V1, V2, V3, V4, overeating, ball tension and drive cutters.
- Non-stop with the hand on rollers - fed the machine in motion.
- Before loading the product on twisted pots, remove the tensioner assembly.
- Each spindle machines have their respective numbers, so that should not be interchanged.
- The operator is responsible for monitoring and patrol breaks of all the machines.
- By moving the spool do it with the utmost care and place them in cars carrying carts cars to the next step of twisting.

CONDICIÓN PARA LA MÁQUINA RETORCEDORA PRIMER PASO

Fecha: 01/06/2011

Producto: Nylon 6.6 alta tenacidad

Procedencia: FOY importado

Núcleo: Carreto

Color núcleo: Café

Instrucciones:

1. Garantizar el número de cabos y la torsión desde el inicio del carreto.
2. No anudar en caso de rotura, sobreponer y realizar la cola de cambio.
3. Verificar el ensarte correcto en todas las posiciones.
4. Revisar que los cops no tengan filamentos rotos.

VARIABLES GENERALES	Unidad	Parámetro	Desviación
DENIER NOMINAL/FILAMENTOS	denier	210F34 X 3	
MAQUINA POSTRATAMIENTO	-	Retorcedora	
CODIGO AFINIDAD	-	5526	
PESO DE LA UNIDAD	Kg	1,5	
NUCLEO ALIMENTADO	Tipo	COP	
VARIABLES RETORCIDO	Unidad	Parámetro	Desviación
HILOS ENSAMBLADOS	No.	3	
NUMERO DE MUDAS	#	4	
PESO DE LA UNIDAD	Kg	0,815	
LONGITUD PRIMERA MUDA	m	10300	
LONGITUD ULTIMA MUDA	m	10300	
TIEMPO DE FORMACION UNIDAD	min	316,24	
TIPO DE FORMACIÓN	cil/bic.	Cilindrico	
VELOCIDAD DEL MOTOR	rpm	1780	10
DIÁMETRO POLEA DEL MOTOR	mm	192	
VELOCIDAD DE HUSOS	rpm	8268	150

VELOCIDAD POLEA PRINCIPAL	rpm	976,46	14
RELACIÓN DE TRANSMISIÓN		1/1	
POLEAS RELACIÓN DE TRANSMISIÓN		30/30	
POLEAS A/B		14/32	
TORSIÓN (SENTIDO)	S o Z	S	
TORSIÓN (NÚMERO)	Tpm	465	15
VELOCIDAD ANGULAR DE RETORCIDO	rpm	103,67	8
VELOCIDAD LINEAL DE RETORCIDO	m/min	32,57	3
POLEAS ZA/ZB		48/14	
SOBREALIMENTACIÓN	%	83,7	0,4
VELOCIDAD ANGULAR SOBREALIMENTACIÓN	rpm	355,97	20
VELOCIDAD LINEAL DE SOBREALIMENTACIÓN	m/min	59,83	3
GOLPES DOBLES	DH/min	1	
ANGULO DE CRUCE	grado-min	15,34	
DISPOSITIVO DE FORMACIÓN BICÓNICA	pos	0	
DESPLAZAMIENTO PRINCIPAL	mm	200	
ALTURA GUÍA ANTIBALÓN	mm	480	
RESERVA DE HILO	vueltas	2	
DIÁMETRO OLLAS	mm	130 (huso 42)	
MODULOS TENSORES	mm	14/14	
ESFERAS/DIAMETRO	N/mm	9/5	
CONTROL DE CONDICIONES	Unidad	Parámetro	Desviación
TENSIÓN DE BALÓN	cN	115	
TENSIÓN DE BOBINADO	cN	25	
CONTROL DE LABORATORIO	Unidad	Parámetro	Desviación
Título	denier	658	3
Tenacidad	g/denier	8	0,5
Elongación	%	20	3
HI-190 c	%	4,5	1
Loops	N/100m	0	0,2
Filamentos rotos	N/100m	0	0,2
Torsiones (numero)	Tpm	465	15
Vividez por metro	v v / m	200	3
Dureza	Shore	50	3
Aceite	%	0,6	0,3
Diámetro máximo	mm	140	

CONDICIÓN PARA LA MÁQUINA RETORCEDORA SEGUNDO PASO

Fecha: 08/07/2011

Producto: Nylon 6.6 alta tenacidad

Procedencia: FOY importado

Núcleo: Tubo plástico perforado

Color núcleo: Blanco/transparente

Instrucciones:

1. Garantizar el número de cabos y la torsión desde el inicio del paquete.
2. No anudar en caso de rotura, sobreponer y realizar la cola de cambio.
3. Verificar el ensarte correcto en todas las posiciones.
4. Revisar que los carretos no tengan filamentos rotos y que los bordes estén pulidos.

VARIABLES GENERALES	Unidad	Parámetro	Desviación
DENIER NOMINAL/FILAMENTOS	denier	210F34 X 3	
MAQUINA POSTRATAMIENTO	-	Retorcedora	
CODIGO AFINIDAD	-	5527	
PESO DE LA UNIDAD	Kg	0,815	
NUCLEO ALIMENTADO	Tipo	CARRETE	

VARIABLES RETORCIDO	Unidad	Parámetro	Desviación
HILOS ENSAMBLADOS	No.	3	
NUMERO DE MUDAS	#	1	
PESO DE LA UNIDAD	Kg	0,815	
LONGITUD PRIMERA MUDA	m	10100	
LONGITUD ULTIMA MUDA	m	10100	
TIEMPO DE FORMACION UNIDAD	min	248,46	
TIPO DE FORMACIÓN	cil/bic.	BICONICA	
VELOCIDAD DEL MOTOR	rpm	1780	10
DIÁMETRO POLEA DEL MOTOR	mm	175	
VELOCIDAD DE HUSOS	rpm	7544	150
VELOCIDAD POLEA PRINCIPAL	rpm	890	14
RELACIÓN DE TRANSMISIÓN		1/1	
POLEAS RELACIÓN DE TRANSMISIÓN		30/30	
POLEAS A/B		22/31	
TORSIÓN (SENTIDO)	S o Z	Z	
TORSIÓN (NÚMERO)	Tpm	371	15
VELOCIDAD ANGULAR DE RETORCIDO	rpm	153,34	8
VELOCIDAD LINEAL DE RETORCIDO	m/min	40,65	3
POLEAS ZA/ZB		40/14	
SOBREALIMENTACIÓN	%	81,18	0,4
VELOCIDAD ANGULAR SOBREALIMENTACIÓN	rpm	438,13	20
VELOCIDAD LINEAL DE SOBREALIMENTACIÓN	m/min	73,65	3
GOLPES DOBLES	DH/min	28	
ANGULO DE CRUCE	grado-min	15,34	
DISPOSITIVO DE FORMACIÓN BICÓNICA	pos	10	
DESPLAZAMIENTO PRINCIPAL	mm	180	
ALTURA GUÍA ANTIBALÓN	mm	480	
RESERVA DE HILO	vueltas	2	
DIÁMETRO OLLAS	mm	130 (huso 42)	
MODULOS TENSORES	mm	15/14	
ESFERAS/DIAMETRO	N/mm	5/5	
CONTROL DE CONDICIONES	Unidad	Parámetro	Desviación
TENSIÓN DE BALÓN	cN	150	
TENSIÓN DE BOBINADO	cN	30	
CONTROL DE LABORATORIO	Unidad	Parámetro	Desviación
Titulo	denier	665	3
Tenacidad	g/denier	7	0,5
Elongación	%	21	3
HI-190 c	%	4,5	1
Loops	N/100m	0	0,2
Filamentos rotos	N/100m	0	0,2
Torsiones (numero)	Tpm	355	15
Vividez por metro	v v / m	14	3
Dureza	Shore	38	3
Aceite	%	0,5	0,3
Diámetro máximo	mm	140	

4. DYE

The dyeing is a process that gives the yarn the claimed **color** by the end customer, this depends on the daily life, fashion, culture, etc.

The term color refers to a feeling receipted by the eye and transmitted by a nerve flow to the brain.

The equipment used for dyeing is industrial autoclaves. These devices are designed to withstand high temperatures and pressures which have some general characteristics that allow a proper operation.



Figure: Autoclave to dye

For dyeing auxiliaries and dyes are needed to allow access to the desired tone, and a dye curve with the required temperature gradient.

4.1 STANDARDS OF DRY QUALITY

After the dyeing process of a batch, centrifuge immediately, the first load and then randomly pick a spring or muff.

- From spring or muff chosen, you get in a position of fierce machine, three cones of external parts; middle and inner (fester without oil). Correctly identifying these cones.

- The cones samples are delivered to the Qualification Operator which qualifies the batch and weaves them penalty according to the instructions of their area.
- Once the batch has been accepted by the Qualification Laboratory, the sample of the half cones is produced and the measurements are performed in the spectrophotometer (Datacolor).
- If the color difference (DE.CMC.) between the standard sample and half cones is less than or equal to 1.5 the batch is approved, otherwise it is rejected.
- If the DE.CMC. is outside of rule it shall issue a lock.
- When there is a blocked batch a second is not worked until its release or authorization, who supports this action by signing the recipe format.

5. BONDED

The bonding is a process which is applied to nylon transparent film of a polymer-based polyester or nylon to avoid as much as possible the friction that is submitted the threads in seams of rigid materials.

The bonding process is performed on a machine specially designed for this process, in which the thread performs the following steps: soaking, draining, drying and finally lubricated to fester in the footage requested by the consumer.



Figure: Bonding machine of three furnaces

5.1 STANDARDS BONDED QUALITY

We will list the most important points from the preparation of the bonding solution, preparation and operation of the machine:

- Always work with mask and gloves when mixing.
- After use alcohol always close the lid so it does not evaporate and lose the properties.
- Always after weighing the bonding agent close up the bag or plastic tank to not get wet the granules or solidify the emulsion.
- Wash all equipment used after preparing the solution to prevent solidification of bonding residues.
- Ovens machine must be stabilized at the required temperature before starting work.
- Put packages in the creel yarn, and thread correctly by all the elements that will be in contact with the thread.
- Check that the rubber of the squeezed system is in good conditions.
- Always work on knobs combs input - output, exhaust fumes bonding, and oven extractors.
- Conduct parts cleaning machine at the end of each shift.

CONDICIÓN PARA LA MÁQUINA BONDEADORA

Fecha: 12/08/2011

Producto: Nylon 6.6 alta tenacidad

Procedencia: FOY importado

Núcleo: Carreto metálico

Color núcleo: Aluminio

Instrucciones:

1. Garantizar el correcto ensarte de todos los hilos.
2. Revisar la cuba de bonding y mantener el nivel del bonding.
3. Tomar las tensiones luego del arranque.
4. Luego de terminar el proceso devanar las puntas para verificar nivel de bondeado.

VARIABLES GENERALES	Unidad	Parámetro	Desviación
DENIER NOMINAL/FILAMENTOS	denier	210F34 X 3	
MAQUINA POSTRATAMIENTO	-	Bondeadora	
CODIGO AFINIDAD	-	5527	
PESO DE LA UNIDAD	Kg	0,815	
NUCLEO ALIMENTADO	Tipo	TUBO PERFORADO	

VARIABLES RETORCIDO	Unidad	Parámetro	Desviación
HILOS ENSAMBLADOS	No.	3	
NUMERO DE MUDAS	#	1	
PESO DE LA UNIDAD	Kg	0,84	
LONGITUD PRIMERA MUDA	m	10100	
LONGITUD ULTIMA MUDA	m	10100	
TIEMPO DE FORMACION UNIDAD	min	84,17	
VELOCIDAD DE ENTRADA	m/min	118	
VELOCIDAD DE SALIDA	m/min	120	10
RELACIÓN DE ESTIRO	%	1,69	
VELOCIDAD DE HUSOS	Hz	115	150
VELOCIDAD DE RODILLO LUBRICANTE	rpm	1,4	14
PRESIÓN DE EXPRIMIDO	bar	1,2	
TEMPERATURA 1º HORNO	°C	195	
TEMPERATURA 2º HORNO	°C	200	
TEMPERATURA 3º HORNO	°C	205	
CONTROL DE CONDICIONES	Unidad	Parámetro	Desviación
TENSIÓN SALIDA DE HORNOS	cN	170	
TENSION DE HUSOS	cN	140	
CONTROL DE LABORATORIO	Unidad	Parámetro	Desviación
Título	denier	710	3
Tenacidad	g/denier	7	0,5
Elongacion	%	20	3
HI-190 c	%	2	1
Loops	N/100m	0	0,2
Filamentos rotos	N/100m	0	0,2
Torsiones (numero)	Tpm	365	15
Vividez por metro	v v / m	4	3
Aceite	%	4	0,3

6. REWIND

The main functions are change a product from one presentation to another, adding lubrication to the fiber surface which will serve to unite the strands and create a protective film around the wire, besides an adequate winding to ensure a correct processing of thread on its final use.

The main causes of the rupture of the filaments during the rewind are the existence of excessive tension and the generation of static charge on the plates of tension.



Figure: Drum machine groove bitter

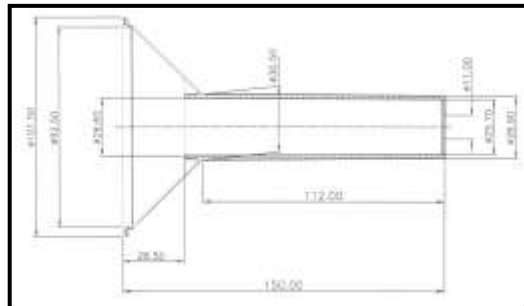


Figure: Map of king spool cones rewind machine

6.1 STANDARDS OF REWIND QUALITY

Cones obtained should be subjected to a quality control process to ensure its final use. Example: control of affinity, training, physical defects, etc. The qualified cones are delivered to the selection area for their respective package according to the established standards.

As general rules are listed as follows:

- Place cards of maintenance held in position with poor training and oil stains.
- Perform cleaning machine at the end of each shift, it must be done by downloading the production.
- Any leakage of oil mops the floor immediately and asks for a mechanical intervention of the area.

- Verify correct stringing of all positions after starting especially oil guides and jets. Ensure that all trap-speck are enabled.
- In the event of a break or to start a new clothing not to knot; join with the air gun.
- Rewind immediately all cone with poor formation.
- Place labels at each cone with the corresponding information about the machine on which it is worked, size, yarn type, color, operator, to facilitate the following tracking and traceability of the festered product.

7. SEWING TEST

As a penultimate stage involves sewing as a final test to assess whether release of bonding on the needle or thread breakage by heating it.

The main objective of this method is to describe the behavior of the thread in sewing the final application, resistance and thermal protection.

The procedure is as follows:

- Prepare the machine with the correct threaded. Work 2 needles (left-right).
- The tension of both upper and lower wire should be balanced to have a correct sewing and avoid winding problems.
- Put the previously prepared material (band 200cm x 30cm)
- It works at full machine speed.
- Monitoring is done in the report:

Material	Capas	Hilo	Nro de agujas	Nro revientes/100m		Metros evaluados	Observaciones
				Izq.	derecha		
jean 420 g/m2 172 cm	1	NB 40	2	1	0	100	Enredos

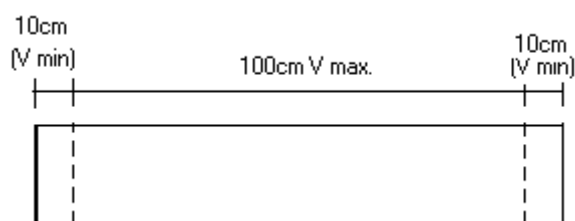
Nota: máquina de costura SIRUBA T828-72-064ML 1/4 (6.4)

Additional a test is performed to evaluate the thermal protection:

- Prepare the machine with the correct threaded. Work 1 needle (right)
- The strain of both upper and lower wire should be balanced to have a correct sewing and avoid winding
- Sew into strip 120cm x 15 cm / (# of layers)
- Number of layers.- denim for jeans 420g/m2 and the final assessment is made according to the number of layers that resist stitching 10 runs without melting more than 2 times. When it is melted more than 2 times the test is stopped and the score is the number of layers of cloth with the note of fades.

It starts with a minimum of 6 layers to shorten the test and to sew 10 runs and does not melt is passes to the next layer (7) and so on until the maximum allowed by the capacity of the machine. (Usually 8 or 9). In all cases the maximum for layers that is capable of sewing a thread without melting more than 2 times in the test

- Note 10cm to the two ends of the cloth.
- It starts with minimum speed up to 10cm, from them it works at it full speed of the machine until the next signal, the last 10cm reduce the speed to get more contact of the needle whit the thread



- Monitoring is done in the report:

Material	Capas	Hilo	Nro/revientes Nro/fundidos en 100cm (Vel max)	Nro/revientes Nro/fundidos en 10cm (Vel min)	Distancia revientes	METROS EVALUADOS	CAUSAS
Jean 420 g/m2 120 cm	8	NB 40	0	2	5 carreras 11carreras	47 carreras	Hilos fundidos

Nota: trabajar con aguja derecha.

- To determine the exact cause of the break it is analyzed under a microscope or a magnifying glass, the ends of the wire melted.

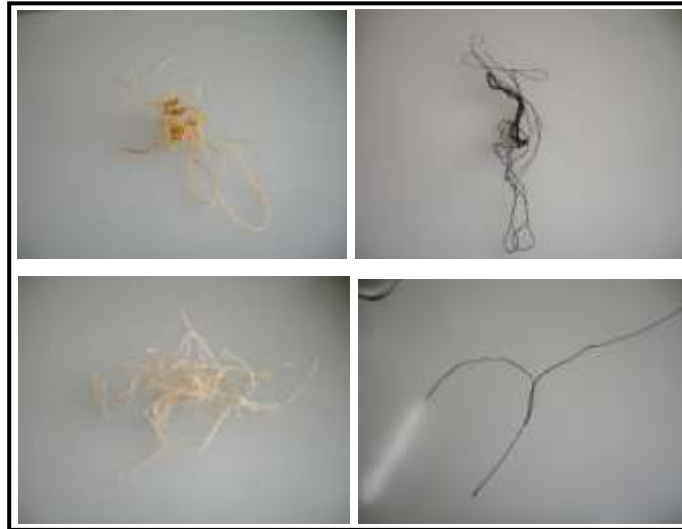


Figure: Defects of the wire bonding

8. PACKING

The container and packaging are used to protect products during transport and storage stages and ensure that the product arrives in top condition to the final consumer.

- The container in this case refers to the plastic bags that protect each cone and it is the presentation to the final consumer.
- Packaging is the container, box or container that is used to group and carry the king spool cones. It serves to protect the contents during their transportation and reports on its handling conditions.



Figure: Packaging in boxes of sewing thread

8.1 PACKAGING QUALITY STANDARDS

Are the main recommendations to ensure a correct product packaging.

- The spots by manipulation disappear applying a swab impregnated with an emulsion for cleaning. Oily or greasy stains it is known beforehand that not disappear and therefore it is useless waste of time trying to clean them.
- All products are checked for identification stamps inside the cores and that this information matches the card transport.
- Units with defective cores must be returned for reprocessing.
- Units with poor training (steps and large scales) must be returned for reprocessing in the respective area. Soft steps up to half millimeter are accepted as normal.
- Units with weight above or below to the set must be returned to the respective area for the necessary correction.
- To manipulate the product; the prior packed must wash his hands and possibly hold the units from the cores.
- When you select the units never touch the forming angles with the hands.
- Place the units in the boxes properly and avoid excessive friction
- Do not pack up any product; submit the following types of problems: shoulders or hard edges, steps or scales, different angle of training, excessive diameter.
- If poor production exceeds 5% of failures the production will be blocked and it's packaging too to make the necessary corrections.
- Always use the appropriate boxes according to the product to pack.