

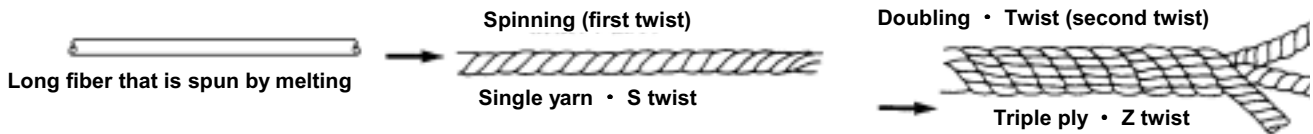
# Knowledge of the sewing thread

## 1. Construction and manufacturing process of the sewing thread

Natural textile products such as cotton thread, silk thread, etc. have been used as sewing thread before. Nowadays, however, chemical fiber products such as polyester thread, nylon thread, etc. are largely used. Filament thread, spun thread, woolly thread, mono-filament thread, etc. are properly used in accordance with materials or applications. These threads are different from one another in construction and manufacturing process as given below.

Filament thread

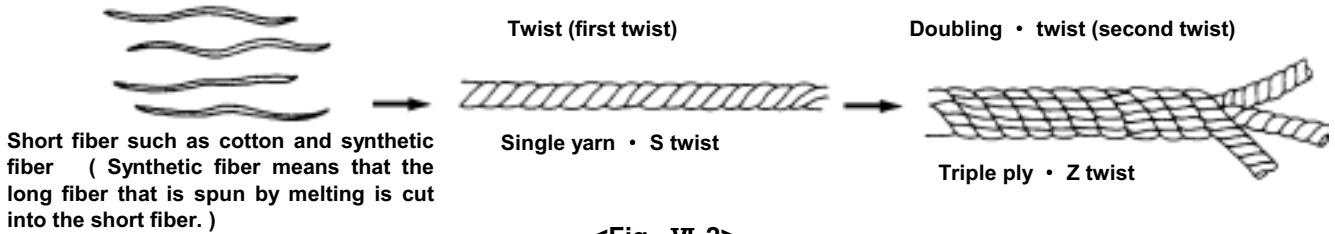
Filament thread means that left twist (Z twist) is applied to the thread after right twist (S twist) is applied to the filament (long fiber) that is spun by melting and doubling of 2 to 3 filaments is performed.



<Fig. VI-1>

Spun thread (cotton thread, synthetic spun thread)

Spun thread means that left twist (Z twist) (second twist) is applied to the staple (short fiber) after doubling (first twist) of right twisted single yarn and doubling of 2 to 3 yarns is performed.

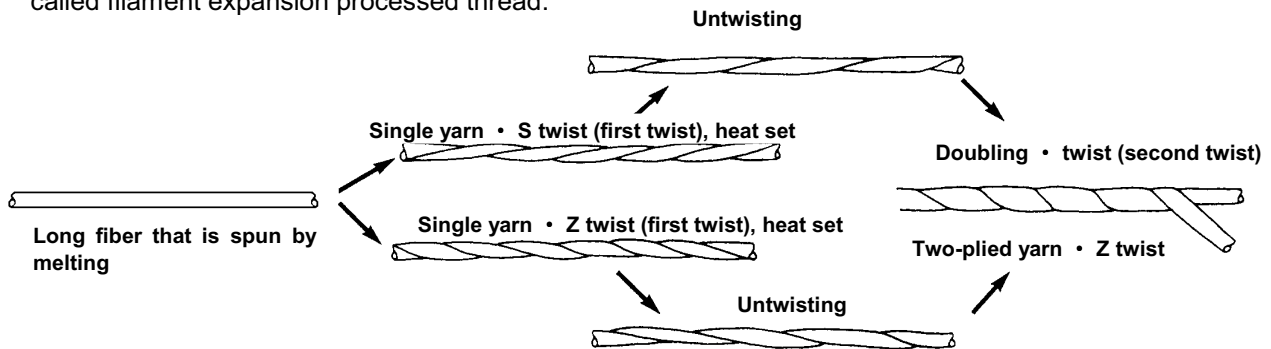


<Fig. VI-2>

Woolly thread

Filament yarn is performed the first twist and the twist is returned after superheating setting in the state that the yarn is strongly pulled.

Woolly thread is a thread that doubling of these two yarns is performed and the twist is applied. This thread is called filament expansion processed thread.



<Fig. VI-3>

## Monofilament thread

This thread is just the same as long fiber that is spun by melting and a long yarn without twist.

In addition to sewing thread, this thread is used for fishing thread or the like.



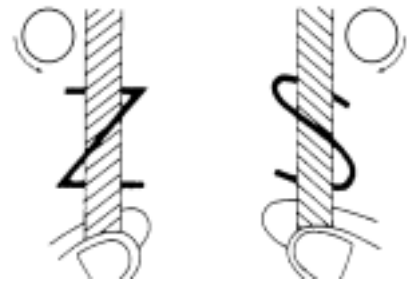
<Fig. VI-4>

## 2. Twist of the sewing thread

Twist of the sewing thread is normally carried out by doubling 2 to 3 yarns and applying left twist (called second twist) to the yarns after applying right twist (called first twist) of single yarn.

The reason is that return of the twist due to the rotation of the hook should be protected and that in case of normal stitching, the form becomes stable since friction between needle eyelet and thread is small and return of twist of thread is difficult to move. On the contrary, when the right twisted thread is used in normal stitching, friction between needle eyelet and thread is large, and the twist is easy to move. Then, the thread loop in the state of return of twist is formed, resulting in stitch skipping or thread breakage.

To distinguish the twist direction, although the right twist is called S twist and the left twist Z twist, when picking up the thread with thumb and first finger of your right hand, the twist line flowing from upper left to lower right along the thumb is seen if it is the right twist. On the contrary, when holding it with your left hand, the twist line flowing from upper right to lower left is seen if it is the left twist.



Z (left twist) S (right twist)

<Fig. VI-5>

## 3. Numbering of the thread thickness

Thread thickness is calculated from the mutual relations between length and weight. The thickness is not represented by the diameter since the cross section of fiber is not a circle. Therefore, the thickness is represented from the relations of "length" and "weight". There are "length numbering system" based on the length and "weight numbering system" based on the weight for the representation.

### 1) Length numbering system

There are mainly Decitex (dtex) and Denier (D)

#### -1 Decitex

Decitex is called "1 dtex" when a piece of yarn, weighing 1 gram, is 10,000 meters long, and "2 dtex" when weighing 2 grams. This numbering is the numbering system for the thickness of sewing thread for industrial sewing machine to be applied to all threads.

#### -2 Denier

Denier is called "1 Denier" when a piece of yarn, weighing 1 gram, is 9,000 meters long, and "2 Denier" when weighing 2 grams.

This numbering is used for silk thread, synthetic filament thread (polyester thread, nylon thread, etc.)

## 2) Weight numbering system

There are mainly metric number, English number, etc.

### -1 Metric number

Metric number is called "Nm 1" when a piece of thread, weighing 1,000 grams, is 1,000 meters long, and "Nm 2" when the thread is 2,000 meters long. This numbering is used for worsted and woolen yarn.

### -2 English number for cotton

English number for cotton is called "Ne 1" when a piece of thread, weighing 1 pound (453.6 g), is 840 (768.1 m) yards long, and "Ne 2" when the thread is 1,680 yards long. The thickness of cotton single yarn is represented by English numbering. This numbering is used for cotton thread, silk spinning and staple fiber.

## 3) Nominal count (thread count)

For "nominal count" (thread count) of the respective filament thread and spinning thread, the nominal count that can be used in JIS (Japanese Industrial Standard) and the range of total size are normalized. Filament thread and spinning thread are different in the total size although "nominal count" is the same. So, be careful.

### -1 Conversion table of sewing thread count

Filament <Table VI-1>

Nominal count (Thread count)	Construction	Total size of thread used dtex (D)	Nominal count (Thread count)	Construction	Total size of thread used dtex (D)
#1	3 x 3	2100 to 2520(1890 to 2250)	#40	1 x 3	300 to 370(270 to 330)
#3	2 x 3	1750 to 2000(1575 to 1800)	#50	1 x 3	220 to 267(200 to 240)
#5	2 x 3	1400 to 1700(1260 to 1500)	#60	1 x 3	155 to 190(140 to 170)
#6	2 x 3	1167 to 1333(1050 to 1200)	#80	1 x 3	117 to 150(105 to 135)
#8	2 x 3	978 to 1100(880 to 1000)	#100	1 x 3	99 to 112(90 to 100)
#10	2 x 3	822 to 955(740 to 860)	#120	1 x 2	78 to 90(70 to 80)
#20	2 x 3	660 to 801(600 to 720)	#140	1 x 2	56 to 66(50 to 60)
#30	1 x 3	440 to 534(400 to 480)	#150	1 x 2	44 to 50(40 to 45)

\* For the indication method of the thickness of sewing thread for industrial sewing machine, indication of "Decitex" and "Nominal count" is compulsory.

Spinning thread &lt;Table VI-2&gt;

Nominal count (Thread count)	Count of original thread (dtex)	Number of doubling threads	Total size	Nominal count (Thread count)	Count of original thread (dtex)	Number of doubling threads	Total size
# 8	20s(300)	4	1200dtex	# 50	50s(120)	3	360dtex
# 20	20s(300)	3	900dtex	# 60	60s(100)	3	300dtex
# 30	30s(200)	3	600dtex	# 80	80s(74)	3	222dtex
# 40	40s(145)	3	435dtex	# 100	64s(92)	2	184dtex

#### 4. Melting point and softening point (° C) of sewing thread

Both points are the indication of thermal resistance. Melting point means the temperature that sewing thread melts by heat. Softening point means the temperature that the thread starts softening by heat. Especially, in case of synthetic thread, stitch skipping or thread breakage occurs according to the circumstances. Accordingly, the thermal resistance is one of the important points. In addition, the thermal resistance affects the temperature setting of iron and press in the rear process. It is necessary to select a proper sewing thread after considering these factors.

Melting point and softening point of general sewing thread &lt;Table VI-3&gt;

	Polyester	Nylon 6	Nylon 66	Vinilon	Cotton
Melting point	255 to 260° C	215 to 220° C	250 to 260° C	Unknown	Decomposed at 150° C
Softening point	238 to 240° C	180° C	230 to 235° C	220 to 230° C	None

As to the cotton, temperature at which the carbonization starts is described.

#### 5. Strength and ductility of the sewing thread

The force that is required to cut sewing thread by applying a load to the sewing thread in a certain direction is called "strength". Percentage of elongation at this time is called "ductility".

Both the strength and the ductility are essential basic quality of sewing thread. For example, as to the strength, when sewing heavy-weight materials, it is necessary to sew with sewing thread having high strength since thread breakage is apt to occur. It is the same in case of preventing thread breakage or puncture when wearing the clothes. As to the ductility, if it is excessive, it will be the cause of seam puckering or stitch skipping, and if it is too low, it may be the cause of thread breakage.

In addition, when wearing clothes, thread breakage may occur unless there is the proper ductility. Both strength and ductility depend on material, processing method and count of sewing thread. Accordingly, it is necessary to select a proper sewing thread after considering sewing conditions, application of sewing products, etc. Normally, when the strength and the ductility are simply used, they mean "pull strength and pull ductility". For other items, there are "hook strength and hook ductility" and "knotting strength and knotting ductility".

Strength and ductility of the sewing thread (Strength conforms to JIS and ductility is shown low.)

<Table VI-4>

Kind No.	Strength Ductility	Polyester sewing thread		Nylon sewing thread		Cotton sewing thread
		Filament	Spinning	Filament	Wooly	
50	gf	1010	1110	950		710
	%	22	18	30		8
110d (1x2) High ductility	gf				850	
	%				35	

\* The above figures slightly differ among the respective thread manufacturers. Use them as reference values