Section T.2
Troubleshooting in Weaving

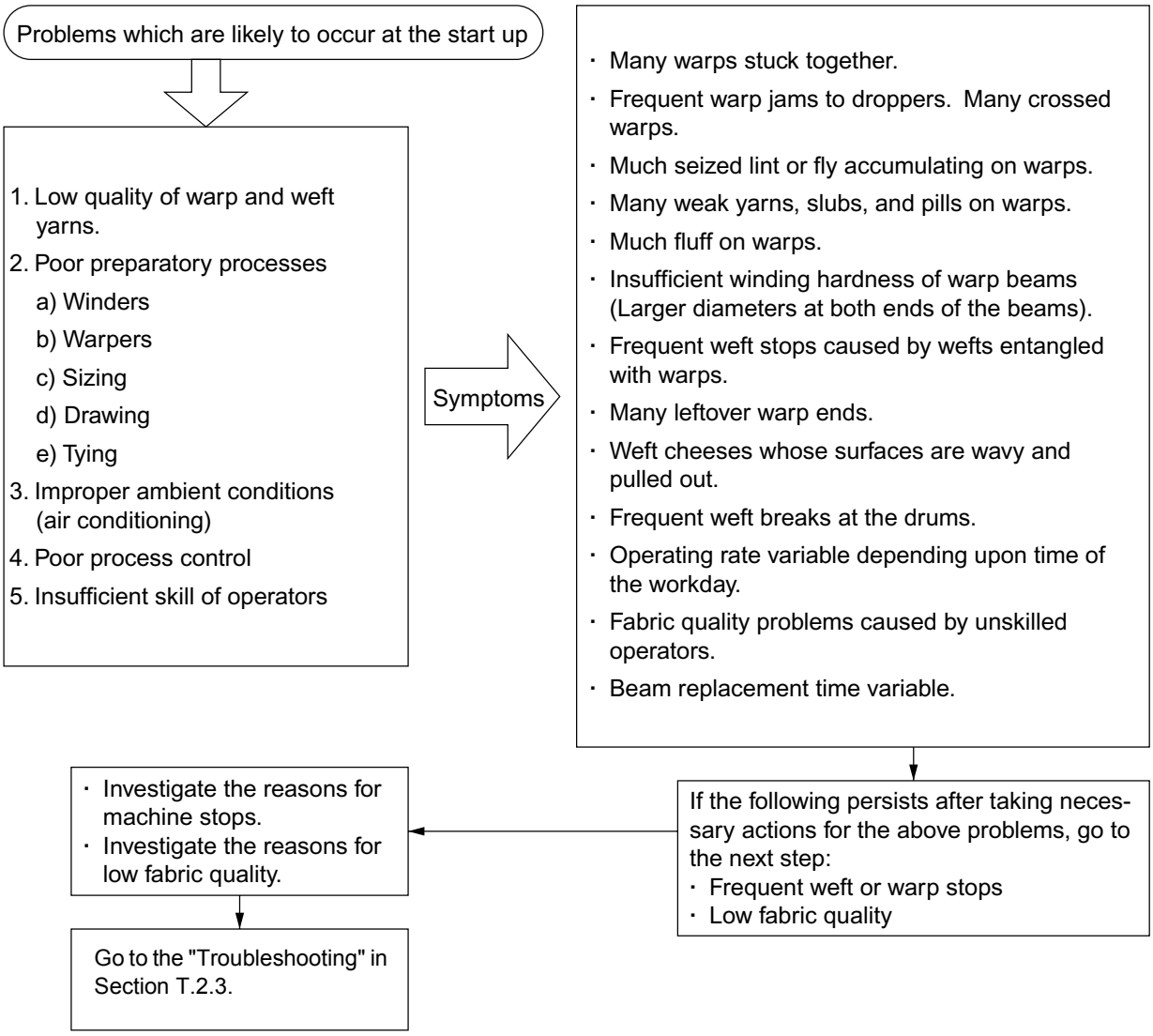
T.2 Troubleshooting in Weaving

T.2.1 All of the Machines Do Not Work Satisfactorily

Immediately after the first start up of air jet weaving machines from the installation or at the weaving start of new style fabrics, it is frequently found that all of the machines do not work satisfactorily (mainly due to frequent broken wefts or warps*). In many cases, such a problem does not result from the fault of the machines themselves but results from unstable operations in your manufacturing processes (due to short-time experience).

Even if the weaving machines do not work satisfactorily, therefore, do not try to adjust them out of the standard ranges. First, analyze your manufacturing processes to find real problem sources.

- Broken wefts or warps can be referred to as weft or warp stops.



T.2.2 Particular Machines Do Not Work Satisfactorily

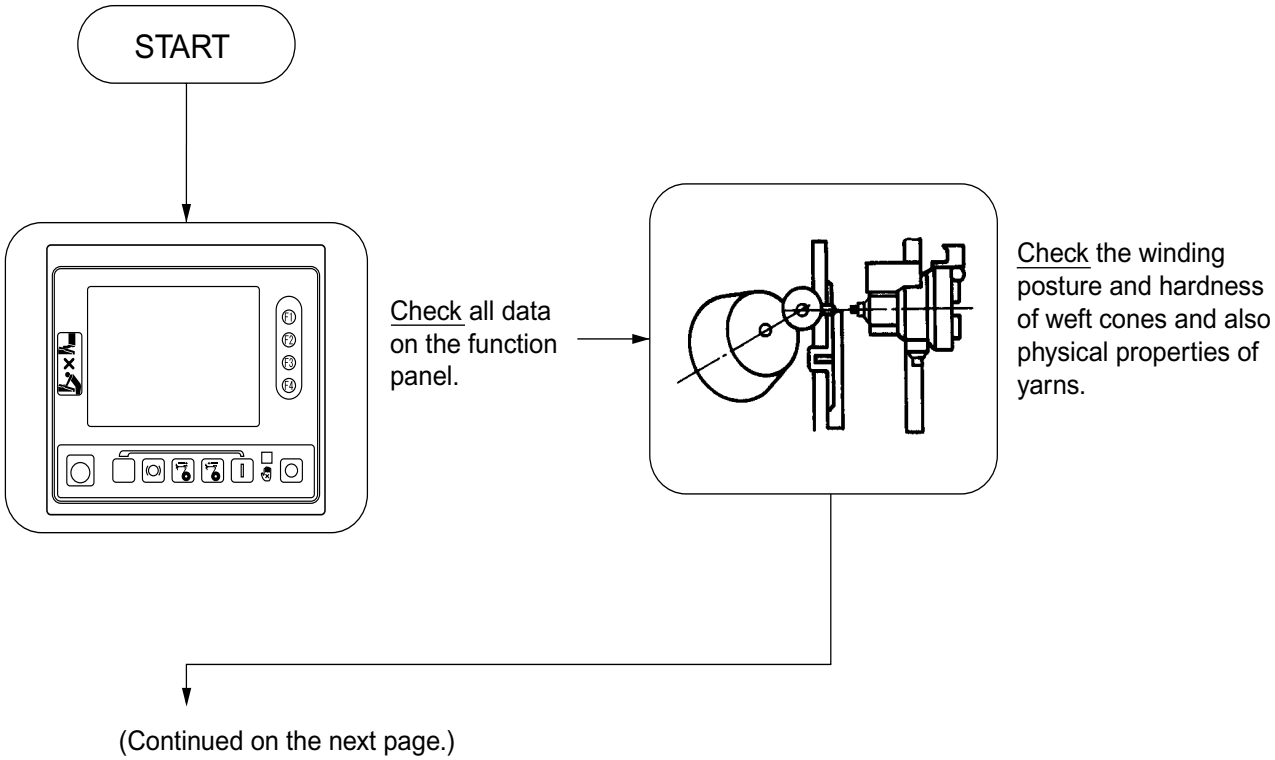
It may be found that particular machines do not work satisfactorily (at the first start up or recently) although other machines work.

If that happens, do not make exclusive adjustments for only those particular machines in trouble. You should find and remove whatever individual problems are occurring in them.

Make up the weaving condition tables on the basis of the ″Weaving Standards for Typical Fabrics.″ → Check the preset conditions and adjustment states of motions and units. → Follow the ″Checking Points for Particular Machines in Trouble″ to check the reasons in detail of the major components.

Checking Points for Particular Machines in Trouble

In the description below, "Check" means: Compare the preset conditions and adjustment states of motions and units of the machine in trouble with those of the normal machines, then correct them if any discrepancies are found.



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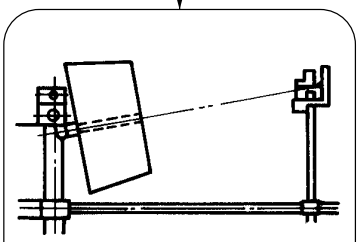
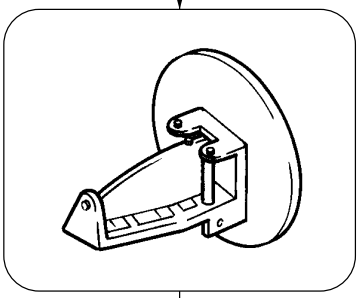
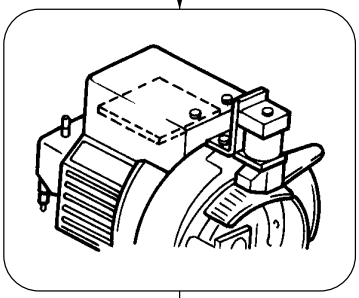


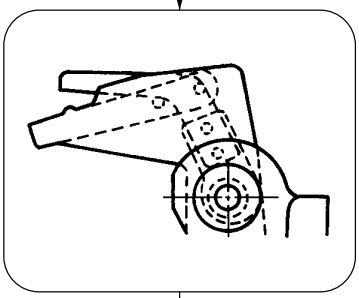
Check the mounting angles and centering of weft cones.



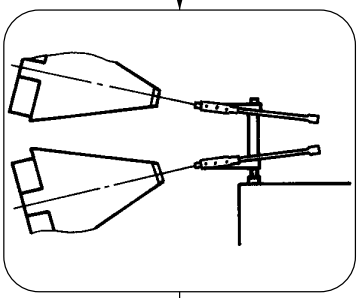
Check the tenser setting.



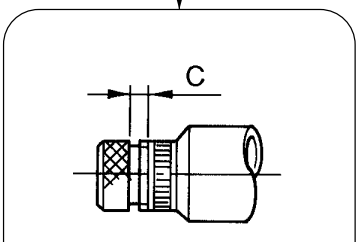
Check the winding posture and the bouncing of wefts on the drums and the clearance between the plunger and the measuring band on each EDP.



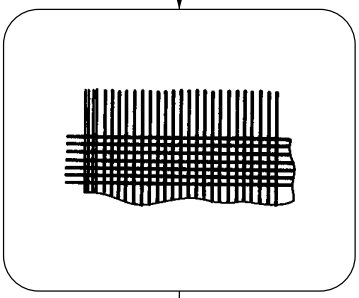
IMPORTANT
Check the sharpness of the cutter, the cutting timing, cutting point, and back tension applied at the time of cutting.



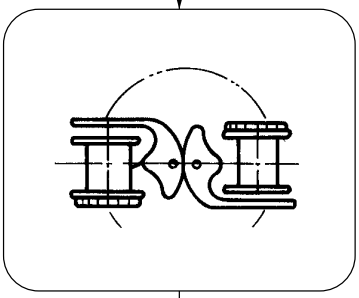
Check the main and tandem nozzles for front-to-rear positioning, up-down positioning, and inclination.



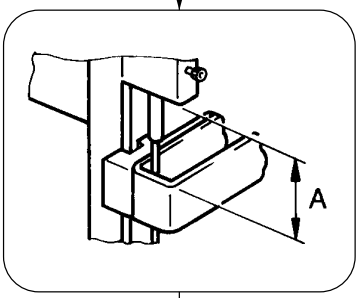
- Check dimension C of main and tandem nozzles.
- Check the breeze pressure and flow scales.
- Check the stand-by yarn coming out of the main nozzle.



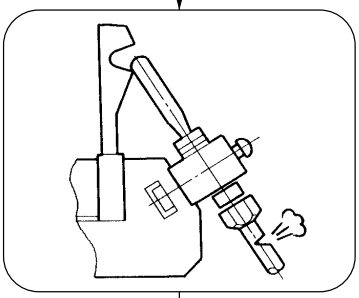
IMPORTANT
Check the matching of selvages at both ends of fabrics, length of fringe selvages, and drawing-in of warps and leno yarns through the reed.



Check the drive timing of full-leno selvage devices and their components for wear.



IMPORTANT
Check the height of heald frames and the shed close timing.



Check the and height of sub nozzles. Also check sub nozzles for air leakage, by touching **OPERATOR – MANUAL – VALVE**.

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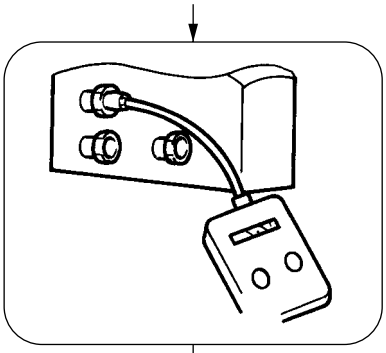
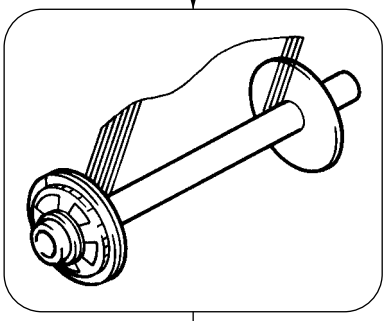


Check the air pressure and flow rate of related sections.



Check the warp beam for the following items:
- Leftover warp ends
- Crossed warps
- Winding shape and hardness
- Pill and fluff
- Uneven seizing

If any problems are found, correct them.

Restart weaving.

Is the operation state good?

NO

Check whether the frequency of machine stops relating to Drum 1 differs from that relating to Drum 2.

Analyze the reasons for machine stops.

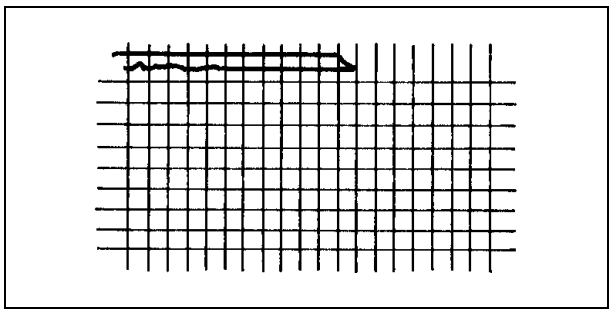
Go to the "Troubleshooting" in Section T.2.3.

YES

END

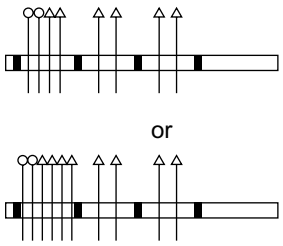
T.2.3 Troubleshooting

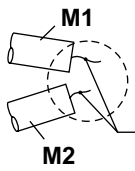
[1] Weft-related Problems

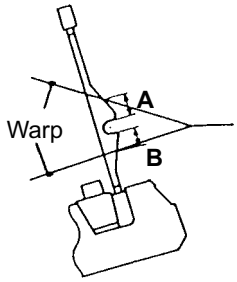


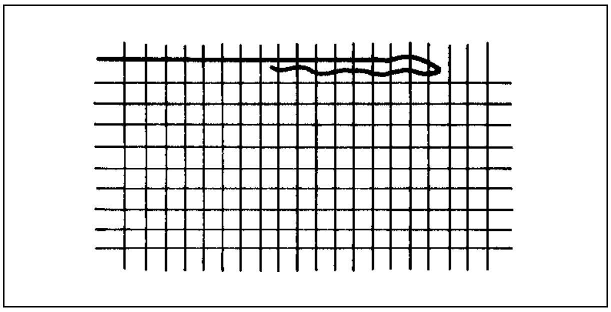
[1.1] Weft entangled with warps at the entrance, resulting in a loop

The leading end of an inserted weft is entangled with warps at the entrance of warps and not fed through warps, resulting in a loop.

CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Is the selvage near the entrance of warps well matched? If NO, check • whether warps are correctly drawn through the heald frames and the reed. • the number of warps drawn through the reed. • whether leno yarns are correctly drawn through the reed.	• Threading through the reed at the LH side (Example)  ○ : Leno yarn △ : Ground yarn or
(2) Is the shed opening clear? If NO, check • the heights of the back roller and the dropper box. • the easing amount and timing. • the warp beam for hardness, winding style and presence of crossed warps. • whether the warp tension is too low. • whether sizing is faulty.	• Standard height of back brackets Fabric texture / Graduation on the back bracket: Plain weave (1/1), Twill (2/2): 0 Twill or satin (2/1, 3/1, 4/1): +1 Twill or satin (1/2, 1/3. 1/4): -2 Dobby: 0 • For the warp tension setting, refer to Chapter 2, Section 2.1.1, [1.2], (3). • If the shed opening is unclear, modify the phase shift angle of tappet cams from 20° to 30°.
(3) Are the shed close timing and shed opening state of LH leno yarns correct? If NO, check • the preset condition of the shed close timing. • the tension springs of full-leno selvage devices. • whether the leno yarn tension is even. • whether there is any fluff on leno yarns. • the bushings for looseness or wear.	• Standard close timing of leno yarns Crank angle: LH: 280° RH: 10° • For the standard leno yarn tension, refer to Chapter 8, Section 8.1.1, [4.3].

<table>
<tr><th colspan="2">CHECK</th><th>ACTION TO BE TAKEN AND STANDARDS</th></tr>
<tr><td>(4)</td><td>Is the posture of standby weft (before the start of weft insertion) proper?
If NO, check
• the air pressure of the breeze.
• the breeze flow rate.
• the relationship between the jet start timing of the main nozzle and the pin opening timing.
• the Tw timing (too late?).</td><td>• Standard breeze pressure: 0.08 MPa (0.8 kg/cm^2)
• Standard breeze level: Pointers of the speed controllers is set to “2.”
Determine the air pressure while checking the posture of standby weft with a stroboscope.
 

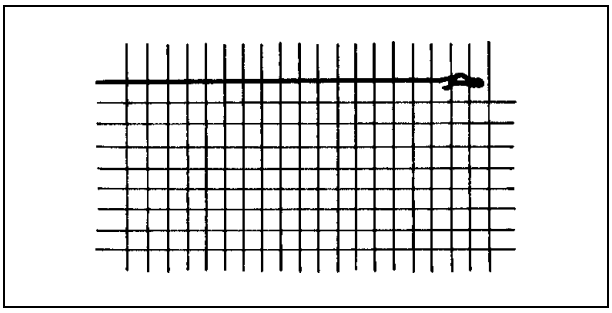
Wefts coming from M1 and M2 should not interfere with each other.</td></tr>
<tr><td>(5)</td><td>Check the LH cutter for the following points:
• Check that the cut end of weft is not fluffy.
• Check the cutter timing.
• Check that the weft posture between the main nozzle(s), tandem nozzle(s), and drum(s) is not influenced excessively by the back tension applied at the time of weft cutting.
• Check that the weft winding style on the drums is not deformed.</td><td>• Standard LH cutting timing
<table><tr><td>Cutter ON timing</td><td>25° to 30°</td></tr></table>
After completion of the cutting timing setting, run the machine and check the actual weft cutting timing and the weft posture between the main nozzle(s), tandem nozzle(s), and drum(s) at the time of weft cutting, with a stroboscope.</td></tr>
<tr><td>(6)</td><td>Is a weft protruded properly from the tip of the main nozzle(s) during the time from the crank angle of 40° until the start of weft insertion?
If NO, check
• the mounting position of the yarn guides.
• the mounting position of the tandem nozzles.</td><td>Refer to Chapter 5, Section 5.1.1, [2].
Refer to Chapter 5, Section 5.1.4, [1].</td></tr>
<tr><td>(7)</td><td>Check the heald frame height (lower warp height).
NOTE: The heald frame height should be checked every month.</td><td>• The relationship between the shed angle and the lower warp height is shown below.
<table><tr><td colspan="2">Yarn type</td><td colspan="3">Spun yarn</td><td>Filament</td></tr><tr><td colspan="2">Shed angle</td><td>30°</td><td>32°</td><td>34°</td><td>24°</td></tr><tr><td rowspan="2">Lower warp height</td><td>1/1, 1/2, 2/2 1/3, 1/4</td><td>24</td><td>23</td><td>21</td><td rowspan="2">22</td></tr><tr><td>2/1, 3/1, 4/1</td><td>23</td><td>22</td><td>20</td></tr></table>
(Unit: mm)</td></tr>
<tr><td>(8)</td><td>Check whether the weft start (pin opening) timing is not too early.</td><td>• At the start of weft insertion, each of distances "A" and "B" (shown below) should be 5 mm or more. According to these distances, determine the pin opening timing.
 
</td></tr>
<tr><td>(9)</td><td>Check whether the temple spreads fabrics correctly.</td><td>• The cloth edge should not work out of the temple edge. If it works out, adjust the temple ring.</td></tr>
</table>



[1.2] Large loop at the middle of woven fabric

The leading end of an inserted weft is folded within the woven fabric, resulting in a large loop.

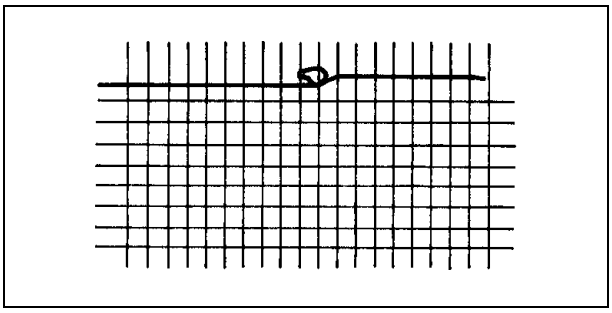
CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Check the arrangement of sub nozzles. Check with manual jetting that each of the sub nozzle pipes is not broken due to interference with the rocking shaft or breast beam which will be caused when those pipes are too long.	• If any of them are broken, repair or replace those defective ones.
(2) Check the picking state from the starting point up to 300 mm for the following points: • Check that a weft does not come out of the reed's tunnel.	• Check the weft arrival timing on the 1st nozzle for sub valve No. 1 with a stroboscope and set the same angle of the weft arrival timing to the jet timing. (Refer to Chapter 5, Section 5.1.6, [3.2], (2).) • Sub nozzle height and jet angle (Refer to Chapter 5, Section 5.1.5, [3.2].) Sub nozzle height – Spun yarn: 3rd groove (+1, nominal) Sub nozzle height – Filament yarn: 2nd groove (±0, nominal) Jet angle: Scale 0° (5° for actual jetting time angle) If a weft comes out of the reed's tunnel although the sub nozzle and jet angle are set as listed above, modify the jet angle for six sub nozzles of sub valve No. 1.
• Check the sub nozzle pressure.	• Typical sub nozzle pressure Spun yarn – Without tandem nozzle: Equal to P_M Spun yarn – With tandem nozzle: P_M + 0.05 MPa (0.5 kg/cm^2) Filament yarn and thick spun yarn: P_M + 0.1 MPa (1.0 kg/cm^2) P_M: Main nozzle pressure
• Check that the jet timings of the main nozzle(s) are proper relative to the pin opening timing.	• Typical main nozzle jet timing (advanced angle) Spun yarn: Pin opening angle + 20° Filament yarn: Pin opening angle + 20°
(3) Check the reed for the following points: • Check that the reed's tunnel is not contaminated. • If a large loop is produced always at the same position, the reed itself may be defective (e.g. grinding fault).	• Clean the reed by referring to Chapter M, Section M.2.1, [4]. • Replace the reed or consult the reed manufacturer.
(4) Refer to item [1.1].	——



[1.3] Curled weft end

The leading end of a weft is curled immediately before it reaches the right end of fabrics.

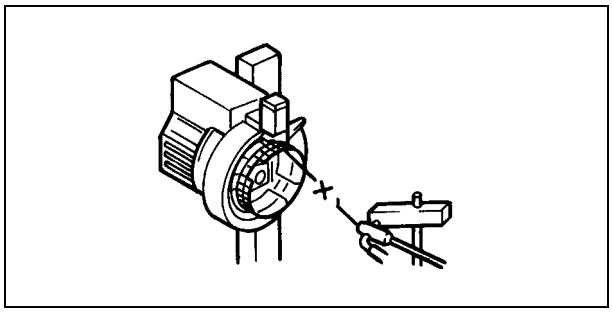
CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Check that the weft arrival timing (Tw) is not too late or early.	• The standard Tw is 230° to 240°. The Tw should be within 250° at the latest timing. If the Tw is too early, the back tension will become great, resulting in the curled weft end.
(2) Check that the shed close timing is not too early.	• For the standard shed close timing, refer to Chapter 4, Section 4.1.2, [1].
(3) Refer to items [1.1] and [1.2].	——



[1.4] Weft passed under lower warp (or above upper warp)

A missed weft is entangled with lower warp (or upper warp).

CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Is the shed opening clear? If NO, check • whether warps (on-beam) are fluffy due to insufficient sizing. • whether there are many warps stuck together due to faulty sizing.	• Improve sizing. Refer to item [2.2].
(2) Check that the shed size is not too small.	• Standard shed size For spun yarn: 32° For filament yarn: 24° The above table shows merely a guide. If T/C warps are used, it is recommended to increase the shed size a little.
(3) Check that the easing timing is not too early or late. Check that the easing amount is not too small.	• The easing timing is matched to the earlier shed close timing as standard. However, match the easing timing to the delayed shed close timing.
(4) Check the number of warps drawn per dent. Check that the installed reed matches the reed space specification of the machine.	• Replace the reed with a proper one.
(5) Refer to item [1.1].	——

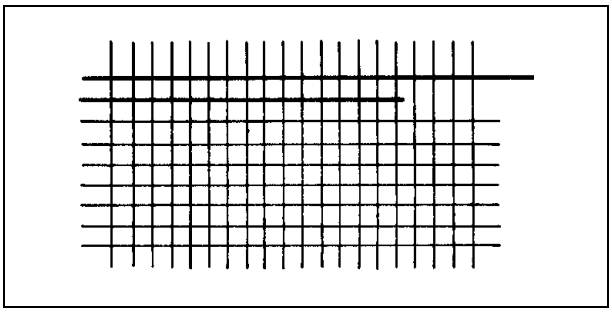


[1.5] Weft break caused between drum, tandem nozzle, and main nozzle

A weft is blown off due to the air pressure applied from the main or sub nozzles.

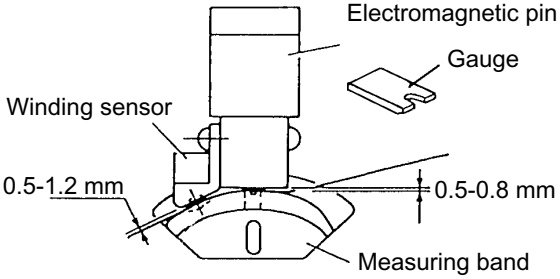
The weft strength is weaker than the spare winding tension or impact when TB0 = Tw.

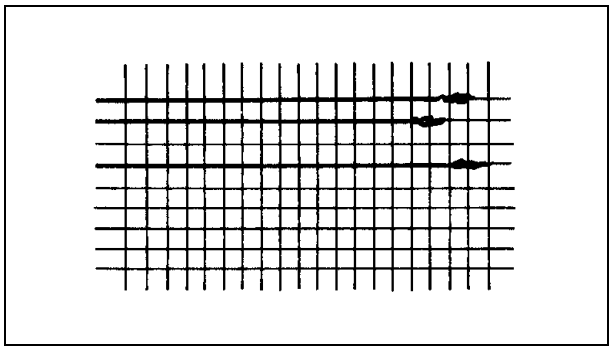
<table>
<tr><th>CHECK</th><th>ACTION TO BE TAKEN AND STANDARDS</th></tr>
<tr><td>(1) Check that the jet end timing of the main nozzle is not too late.</td><td>• Typical jet end timing of main nozzle
<table><tr><td>Yarn type</td><td colspan="2">Spun yarn</td><td colspan="2">Filament yarn</td></tr><tr><td>Machine speed (rpm)</td><td>Less than 800</td><td>800 or higher</td><td>Less than 800</td><td>800 or higher</td></tr><tr><td>Jet end timing</td><td>170°</td><td>160°</td><td>180°</td><td>180°</td></tr></table>
If a weft blow-off occurs even with the above timing, advance the jet end timing or reverse the mounting direction of the check valve on the main nozzle tube.
Reinstall the air pipe in the reverse direction.</td></tr>
<tr><td>(2) Check the pin opening timing.
If the pin opening timing is too delayed, the air pressures of the main and sub nozzles will become too high.</td><td>• Make the pin opening timing earlier to decrease the air pressures of the main and sub nozzles. (Note that the upper limit of the pin opening timing should be 60°.)</td></tr>
<tr><td>(3) Check that the weft arrival timing (Tw) is not too early. (Check that the air pressure of main nozzles is not too high.)</td><td>• The weft arrival timing (Tw) depends upon the air pressure of main nozzles.
The typical Tw is 230° to 240°.
If a weft blow-off occurs even with the above timing, delay the Tw. (Note that Tw should be within 250°.)
Also delay the shed close timing if possible. Doing so will prove effective in preventing blow-off.</td></tr>
<tr><td>(4) Check the quality (strength) of weft.</td><td>• Decrease the machine speed (rpm).
• Change weft.</td></tr>
</table>



[1.6] Short pick or long pick

A picked weft is too short or long.

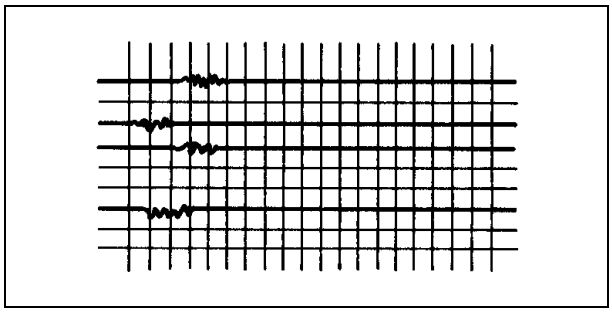
CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) If a short/long pick occurs when the machine is in operation: • Check that the clearance between the electromagnetic pin and the measuring band is correct.	 • When adjusting the clearance between the electromagnetic pin and measuring band and between the winding sensor and measuring band, be sure to use the specified gauge.
• Check the weft winding shape on the drum.	• Improper weft winding shapes result from the wrong cutter timing or dull blade of the LH cutter. They may cause a short pick or long pick. With a stroboscope, check the winding shape immediately before and after a weft is cut.



[1.7] Weft slack at the RH side

When a weft is not stretched yet, shed is closed and the reed beats up the weft.

CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Check the sub valves and nozzles for the following points: • Check that the air pressure of sub nozzles is not low. • Check that the jet time length of sub nozzles is not short. • Check the jet angle (installation angle) of sub nozzles. • Some of the sub valves and nozzles may be defective or installed incorrectly. Check that air is jetting from all of them.	• The difference between Tw and Tbw should be within the range from 10° to 20°. • The typical jet ON-duration angle of sub nozzles should be "Jet starting angle + 40°." (The jet ending angles of rightmost four sub valves should be 260°, 280°, 300°, and 300° from the left, respectively.) If a weft slacks even with the above timing, increase the jet time length.
• Check whether Tw is delayed.	• Advance the Tw.
(2) Do waste selvages catch wefts correctly? If NO, • Check whether the number of wefts used for waste selvages is sufficient. • Check the yarn number count of wefts used. **NOTE:** For special types of yarn (stretch yarn or other yarns which produce high back tension), an optional stretch nozzle is essential. (Refer to Chapter 5, Section 5.1.8.)	• The recommended wefts include yarn having number counts EC23/2S' and EC24/2S', and machine sewing thread.
(3) Check the shed close timing with a stroboscope to confirm that a weft is stretched at the time of shed closing.	• When a weft is fully stretched, the shed should be closed.

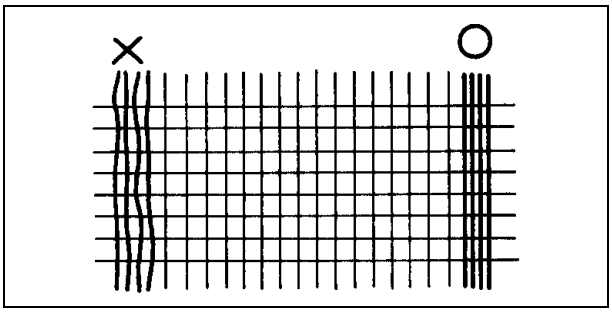


[1.8] Weft slack at the LH side

When a weft is not stretched yet, shed is closed and the reed beats up the weft.

(The larger the Tw shock, more frequently this type of problem will occur. Take any action that decreases the Tw shock or lets weft extend out after Tw shock.)

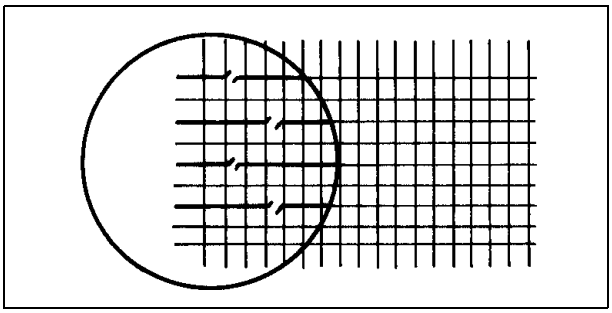
CHECK	ACTION TO BE TAKEN AND STANDARDS
Refer to item [1.7].	Same as left.



[1.9] Slacked edge (selvage) of fabric

Regardless of whether selvage is constructed or not, the edge of fabric slacks resulting in the poor appearance.

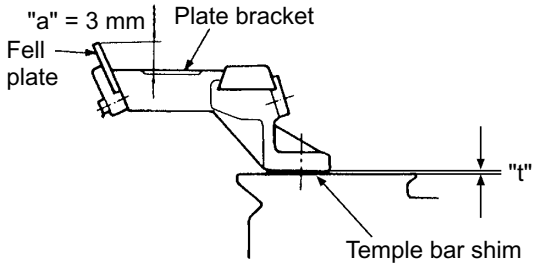
CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Check the warp beam for the following points: • Check that there are no leftover warp ends. • Check that both ends of the warp beam are not thick in winding.	• Improve sizing. Refer to item [2.2].
(2) Check whether yarns at the selvage (including leno yarns) are correctly drawn through the reed.	—
(3) Check whether Tw is too late.	—
(4) Refer to item [1.1].	—

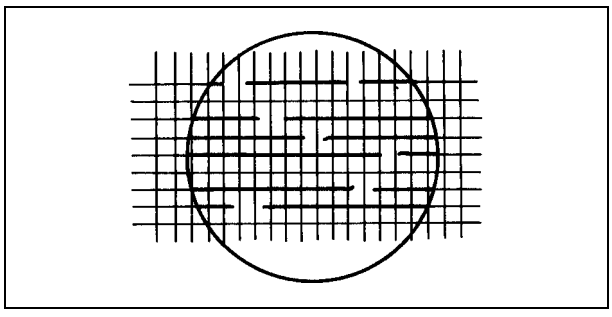


[1.10] Weft break by temple

When the needles on the temple ring work out of fabric, they cut wefts. (This trouble is liable to occur in high-density fabrics.)

CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Check the temple for the following points: • Check the movement of the temple ring. • Check that the temple needles are not broken or bent. • Check whether the temple ring matches the fabric type. • Check that the temple cap is not pressed excessively. • Check that the temple is not turned excessively.	• The drawing out of temple needles becomes smoother in the order of rough → medium → fine → extra fine fabric. On the contrary, the pulling force of temple needles becomes lower. • For weaving some high-density fabrics, single-needle temple rings are recommended.
(2) Check whether picking is too weak.	—

<table>
<tr><th>CHECK</th><th>ACTION TO BE TAKEN AND STANDARDS</th></tr>
<tr><td>(2) Is the cloth fell slacked?
If YES,
• Check the height of the fell plate.
• Check that the surface rollers are not worn.
• Check the easing amount and timing.</td><td>• The thickness of the temple bar shim should be as follows:
<table><tr><th>Texture</th><th>"t"</th></tr><tr><td>1/1, 2/2, 1/2, 1/3, 1/4</td><td>4 mm</td></tr><tr><td>2/1, 3/1, 4/1</td><td>2 mm</td></tr></table>• The height “a” of the fell plate from the top of the plate bracket should be 3 mm.
 
</td></tr>
<tr><td>(3) Check that the warp tension is not too high.</td><td></td></tr>
<tr><td>(4) Check whether the easing timing and amount are proper.</td><td>• If the cloth fell is slacked too much with the standard easing timing, modify the timing and amount.</td></tr>
<tr><td>(5) Check the quality (strength) of weft.</td><td></td></tr>
<tr><td>(6) Check the ambient conditions in the weaving room. Particularly, check that the humidity is not low.</td><td>• The optimum temperature and humidity of the weaving room differ depending upon the yarn type, size, and other conditions. However, it is recommended that the following conditions be assured by air conditioning:
Temperature: 25°C to 30°C
Relative humidity: 65 to 75%</td></tr>
</table>



[1.11] Weft break by beating

A weft is broken due to beating of the reed. This trouble is liable to occur when fine number count yarn is used to weave high-density fabrics. (This will occur frequently on both edges of fabrics with high shrinkage rate.)

CHECK	ACTION TO BE TAKEN AND STANDARDS
(1) Refer to [1.10].	——
(2) Check that the proper reed is selected.	
(3) Check that the weft tension is not too high.	

[2] Warp-related Problems

The warp preparation processes are becoming more important than ever before due to the increasing demands for high-value added, high-quality fabrics and the recent tendency towards small lot, short cycle production of multiple items.

To weave efficiently with the air jet weaving machine,

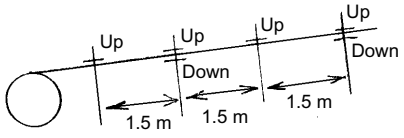
- yarn should have superior properties,
- yarn should be wound with the uniform and proper tension during the warping process, and
- yarn should be sized uniformly and stably with adequate size, then the sized yarn should be wound with constant tension.

[2.1] Requirements for warp

(1) Yarn should be uniform and have sufficient strength and elongation.
(2) Yarn should contain few knots or no loose knots. Those knots, if any, should be small.
(3) Warp sheet should be wound with the uniform tension and have adequate elongation.
(4) Size to be used should match yarn quality, yarn number count, and fabric texture. Size should have optimal viscosity.
(5) Fluff should be bound adequately and yarn should not have partial lack of sizing.
(6) Yarn should be adequately dried and have appropriate moisture absorptiveness.

[2.2] Troubleshooting for Sized Beams

Symptom		Check points	Cause	Action to be taken
(1) Imperfect shedding (Insufficient sizing)	• Overall	• Amount of loaded size	• Less than the standard amount	1) Examine the size and the mixing ratio. 2) Increase the concentration of stock size. 3) Adjust the stock concentration, viscosity, and temperature in the size box to the standard level.
		• Size solution state	• Lowered level of the size box	1) Correct the level controller. 2) Adjust the size temperature.
		• Size mixing	• Size mixing error	1) Check and correct the size used, mixing ratio, size concentration, and cooking time.
		• Squeezing pressure	• Pressure failure • Squeezing roller defective (hardness and surface)	1) Decrease or increase the pressure. 2) Grind the squeezing roller. (Rubber hardness: 45° to 50°) 3) Wind a piece of cloth on the roller.
		• Dry condition	• Yarn feed speed too fast • Insufficient drying	1) Decrease the feed speed to the specified one. 2) Adjust the cylinder temperature (100°C or more). 3) Increase the steam pressure to 0.5 MPa (5 kg/cm^2) or more. Open space: 50% $\frac{\text{Total number of yarns x Yarn dia. (inch)}}{\text{Yarn sheet width (inch)}} \times 100$ Yarn dia. = $\frac{1}{27\sqrt{C}}$ C: Cotton yarn number count
	• Partially (1) Sideways	Order of beams • Squeezing roller	• Insufficient squeezing (right or left)	1) Balance the right and left pressures applied. 2) Correct the diameters at the right and left ends of the roller by grinding.
	(2) Lengthways	• Size solution state	• Lowered level of the size box	1) Check and correct the size feeder.
		• Yarn feed speed	• Low speed operation for a long time	1) Speed up the sizing work. 2) Adjust the pressure during low-speed operation.
		• Squeezing roller	• Scratched or dented roller • Excessive yarn winding on the roller • Roller lowered for a long time	1) Grind the roller. 2) Avoid lowering the roller for a long time (particularly when the temperature is high).
(2) Partial lack of sizing or Fluff (Insufficient shedding)	• Partial lack of sizing around the back roller, dropper, and healds	• Sizing solution • Squeezing pressure	• Insufficient penetration	1) Examine the concentration, viscosity, and temperature of sizing solution. 2) Adjust the squeezing pressure. 3) Grind the roller
	• Fluff on cloth fell (Occurrence of weft miss)	• Sizing solution • Squeezing pressure • Weft divide • Front divide	• Insufficient fluff binding • Insufficient size film strength • Imbalance of adhesion and divides	1) Examine the sizing solution and mixing ratio (penetration and strength). 2) Change the dividing method. (Standard wet: 1/2000 yarns)
(3) Selvage defect	• Soft selvage	• Sizing beam stand • Winder	• Selvage matching on the warpers beam • Beam width matching of the front comb • Low selvage density	1) Match the warpers beam. (row and column) 2) Match the beam width immediately after winding. 3) Correct the number of yarn to be fed to the selvage comb. Total number of warps/(0.6 to 0.8 per dent) x number of dents/blade
	• Hard selvage	• Sizing beam stand • Dryer cylinder • Winder	• Selvage matching on the warpers beam • Insufficient selvage drying • High selvage density	1) Match the warpers beam. (row and column) 2) Adjust the cylinder temperature (100°C or more). 3) Increase the steam pressure to 0.5 MPa (5 kg/cm^2) or more. 4) Correct the selvage density. 5) Correct the unevenness of the contact surface of the press roller.
	• Twill or missing yarn in selvage	• Warpers beam • Sizing beam stand • Winder	• Slacked or broken selvage yarn • Selvage matching on warpers beam • Twisted selvage during sheet drawing • Weavers' beam defective	1) Correct the scratches, dents, and deviation of the warpers beam flange. (Replace the defective beam if necessary.) 2) Match the warpers beam. (row and column) 3) Paste a tape to strong torque yarn or fine yarn. 4) Correct the scratches, dents, and deviation of the weavers' beam flange. 5) Correct the unevenness of the contact surface of the press roller.

Symptom		Check points	Cause	Action to be taken
(4) Taped yarn (Contact yarn)	• Overall	• Yarn • Warping process	• Insufficient strength and elongation of yarn (Yarn waste, snarl, fly, fleece, or loose knots) • Warping failure (Lower shedding, missing yarn, lost shedding, knot failure, fly, fleece, or yarn waste) • Brake failure • Stop motion failure	1) Collect yarn break data and broken warp samples, then feed them back to the spinning process. 2) Correct the warping process. 3) Carry out the proper maintenance for the warper.
		• Sizing operation Size box	• Concentration and viscosity of sizing solution too high • Insufficient squeezing • Wet dividing method • Scratches or sized defect on yarn contact section	1) Improve the management standard of sizing solution. 2) Increase or decrease the roller pressure. 3) Grind the roller. 4) Change the wet dividing method.
		• Winder	• Concentration and Insufficient drying • Yarn sheet trouble • Yarn density and the number of the front comb blades • Front dividing method	1) Increase the cylinder temperature (100°C or more). Increase the yarn feed speed. 2) Increase the steam pressure 0.5 MPa (5 kg/cm^2 or more). 3) Increase or decrease the tension of each section. 4) Number of yarns on the warpers beam x 0.8/blade 5) Change the front dividing method.
	• Partially (Particularly on the selvage)	• Warping process	• Slacked or broken selvage yarn • Imperfect selvage matching • Irregular tension	1) Correct the scratches, dents, and deviation of the warpers beam flange. 2) Take special care for the rear in case of vertical passing. 3) Make accurate selvage matching.
		• Sizing process Beam stand Size box • Winder	• Imperfect selvage matching on the warpers beam • Poor yarn arrangement due to insufficient tension • Insufficient drying • Sized defect on the guide roller	1) Make selvage matching on the row and column. 2) Adjust the tension overall and partially. 3) Adjust the cylinder temperature, steam pressure, and yarn feed speed. 4) Clean the roller.
(5) Sized defect	• Sized defect caused sideways	• Operation	• Long time stoppage of the machine (Defect by the squeezing roller)	1) Shorten the machine stop time or keep low-speed operation.
	• Sized defect in different directions	• Size box	• Concentration and viscosity of sizing solution too high • Excessive steaming	1) Use optimal sizing solution. 2) Adjust the steam pressure to 0.05 MPa (0.5 kg/cm^2). 3) Correct the boiling pipe hole diameter and direction.
	• Sized defect as a film	• Cylinder and guide roller	• Size accumulated on the surface of the cylinder or guide roller • Cylinder temperature	1) Apply teflon treatment to the cylinder and the guide roller. 2) Correct the scratches, dents, or roughness on the surface. 3) Adjust the cylinder temperature. (Lower temperature for yarn having low heat resistance)
	• Sized defect with fly, fleece, or yarn waste	• Size box	• Foreign material getting into sizing solution	1) Clean the size box. 2) Filter the sizing solution.
	• Sized defect in the solid state	• Size box • Mixing method or equipment	• Size dust in sizing solution • Sized defect caused during size mixing	1) Clean the size box. 2) Check the size load speed and the water temperature. 3) Speed up the mixing speed (250 to 300 rpm).
(6) Twill yarn	• Twill yarn at the start of weaving	• Warp drawing process • Sizing process	• Tying or drawing failure • Taping	1) Improve the sheet setting method. 2) Improve the brushing method. 3) Improve the taping method. 
	• Twill yarn halfway through weaving	• Sizing process	• Uneven tension • Sized yarn cutting process failure	1) Adjust the tension. 2) Improve the yarn cutting process.

T.2.4 Reference Data

[1] Specifications and Properties of Yarns Available in the Air Jet Weaving Machine

[1.1] Weft cone (cheese) specifications

Traverse width	6" or less. Recommended to be 3" for fine count yarns.
Winding angle	3"30' for thick count yarns and 5° 57' for medium and fine count yarns
Winding hardness	50° to 70° (It must be collapsed unless the shore hardness or winding hardness is risen.)
Twill angle	Smaller the better (Be careful to sticking among yarns themselves.)
Knot	Knotless yarns are better (below 3 mm).
Ribbon winding	Apply the ribbon brake.
Bobbin diameter	Recommended to be 300 to 330 mm max. for T/C45.
Steam set	Effective in some cases.
Number of winds	The more, the better

[1.2] Physical properties required for yarn (Minimum values)

Item		Yarn type												
		Pure cotton yarn											Polyester yarn blended with 35% cotton	
		Yarn spun by ring spinning (Carded yarn)					Yarn spun by ring spinning (Combed yarn)					Yarn spun by open end spinning		
		Yarn count (Ne)												
		10	16	20	30	40	30	40	50	60	80	20	34	45
Yarn count fluctuation rate	%	0 or less	2.0	2.0	2.0	2.5	1.8	1.8	1.9	1.9	1.9	1.6	1.9	1.9
Single-ply yarn strength	g	840 or more	500	400	260	200	290	215	200	170	130	310	380	270
Strength fluctuation rate	%	8.8 or less	10.2	10.3	10.7	11.0	8.4	9.5	9.3	10.2	10.9	9.9	10.2	11.9
Minimum single ply yarn strength	g	705 or more	420	335	220	165	245	175	165	140	110	260	310	215
Elasticity	%	7.4 or more	6.7	6.5	6.0	5.7	6.0	5.6	5.6	5.5	5.5	7.3	10.5	9.5
U	%	10.8 or less	12.5	13.5	15.1	15.7	10.8	12.0	12.1	12.8	13.2	11.8	11.9	13.0
CV	%	13.5 or less	15.6	16.9	18.9	19.6	13.5	15.0	15.1	16.0	16.5	14.8	14.9	16.3
IPI value/1000 m	Thin	1 or less	4	30	60	80	6	15	20	30	60	4	6	20
	Thick	20 or less	100	240	450	520	50	105	60	95	160	20	55	100
	Nep	20 or less	100	200	420	600	50	90	85	115	140	310	80	110
Reference value (in fiscal year 1987) Japan Spinning Industries Association Data IPI Value (Piece/1000 m)	Thin	1	4	35	71	100	8	24	32	37	95	4	9	33
	Thick	11	62	152	326	403	31	74	46	74	124	10	37	74
	Nep	14	68	153	322	482	37	60	64	81	108	218	58	85