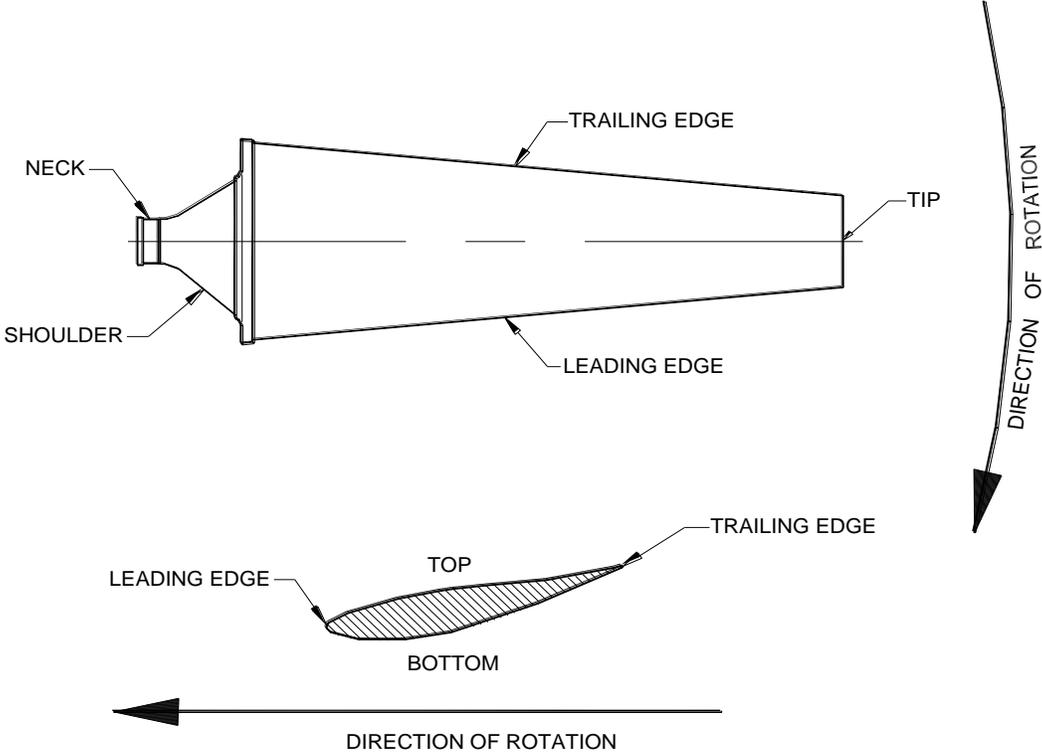


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1. DEFINITIONS

- 1.1 The **leading edge** is the rounded portion of the blade.
- 1.2 The **trailing edge** is the thin section of the blade.
- 1.3 The **neck** is the cylindrical area under the blade clamps.
- 1.4 The **shoulders** are the tapered transition area from the neck to the widest part of the blade.



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INITIALS		RCM	AP	JPH	JPH	LRS	CY	LRS	SR

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2. INSPECTION PROCEDURE

- 2.1 Inspection frequency should be no longer than one year.
- 2.2 Number the blades in sequence, in the direction of rotation. Record the cell identification, blade number and location of all defects for future reference. Use either the sequential blade number or blade serial number. The blade serial number is located on the bottom surface near the wide chord for TufLite II® (White, previously Blue) and TufLite III® (White, previously Green). The blade serial number is on the top for TufLite® (Black) blade.
- 2.3 **Check blade for structural integrity.** Firmly grasp the tip of the blade, then twist & move blade around. It should be securely clamped at the neck, with no movement possible. Inspect the blade for any signs of physical damage. Push down on various parts of the upper and lower surfaces of the blade. The entire blade should feel rigid, but not brittle.
- If the blade feels loose or you can change pitch, reset pitch, track and torque the blade per the installation guidelines. If it is still loose, replace the blade.
 - If any part of the blade is soft or brittle, replace the blade.
 - If there are any holes in the blade or areas which have collapsed, replace the blade.
- 2.1 **Inspect the entire blade for exposed fiberglass.** If there are any areas where the fiberglass laminate is exposed, recoat blade with a Hudson approved material. If one or more layers of fiberglass laminate have worn away or if the fiberglass feels soft, replace the blade.
- 2.2 **Inspect for cracks.** If a crack is found, make a mark alongside the crack using a waterproof marker. The mark should extend the full length of the crack, designating in particular the ends of the crack (see Section 3).
- Small surface cracks are caused by resin rich areas and are not harmful.
 - Cracks next to the blade clamp are potentially serious. (see Section 3)

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- 2.6 **Inspect the leading edge for pitting.** It is normal for some of the paint layer to wear off near the leading edge. Hudson recommends that these areas be touched up with the proper materials during routine scheduled maintenance (see Section 3).
- If there is leading edge erosion which has exposed the top layer of fiberglass, it should be recoated. Consult with Hudson Products for the proper materials.
 - If there are pits in the leading edge ¼” deep or more, these areas should be filled and recoated. Consult with Hudson Products for the proper materials.
 - If there are holes in the leading edge, the blade should be replaced.
- 2.7 **Inspect the trailing edge for splits.** If a split is found, insert a small pen knife blade (about 2” long) to confirm that the split goes completely through the trailing edge. If so, mark the blade and replace. Splits cannot and should not be repaired.
- 2.8 **Inspect the top of the blade for discoloration..** After several years of operation, the paint on the top surface of the blade will fade or be worn off. The sun’s ultraviolet rays will then attack the blade resin and weaken the blade.
- Blades should be repainted every 3-5 years to increase the life of the blade. Consult with Hudson Products for the proper materials.
 - If 50% or more top surface of the blade has become gray or white with age, or if 50% or more top surface of the blade has a fuzzy texture, refer to Section 2.4.
- 2.9 **Check rubber blade cover.** On the TufLite II® (White, previously Blue) blades only, inspect the rubber blade cover to determine if it is still securely bonded. If not, it can be bonded in the field using cyanoacrylate adhesive, available as “super glue” or from Hudson Products. Note: This step does not apply to TufLite® (Black) or TufLite III® (White, previously Green) blades.
- 2.10 **Clear drain hole(s).** Check to make sure the drain hole(s) in the tip of the blade is (are) open so water can drain from inside the blade. Clean out clogged hole(s) with a 3/8” x 12” drill bit or rod.
- 2.11 Repeat steps 2.2 through 2.10 for every blade, recording the condition of each blade for future reference.
- 2.12 **Torque Bolts.** Check torque on blade clamp bolts if blade is loose per Section 2.3.

Blade Clamp Bolt Torques (Non Lubricated)

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<u>Fan Diameter</u>	<u>TufLite (Black) Blades</u>	<u>TufLiteII (White, previously Blue) Blades</u>
5-14 ft.	20 ft-lb.	80 ft-lb.
15-32 ft.	125 ft-lb.	125 ft-lb.
34-40 ft.	300 ft-lb.	300 ft-lb.

3. BLADE DEFECTS

3.1 CRACKS

- Surface cracks are caused by resin rich areas on the blade's surface. They are most commonly found on the tapered shoulders of the blade. As long as these cracks do not penetrate the fiberglass they are considered cosmetic only. Check depth with a small (about 2" blade length) penknife tip. If a crack does not penetrate the fiberglass layers, it is not harmful. Surface cracks can be patched. Contact Hudson Products for the proper materials.
- Cracks next to the blade clamp area are potentially serious. Mark crack length and re-inspect within 30 days. If a crack in the neck area grows 0.25" (6 mm) or more, the blade should be replaced. If there are any cracks adjacent to blade clamps over 3" long, replace the blade immediately.
- Cracks in the trailing edge are not considered harmful unless they penetrate completely through the trailing edge. If the trailing edge has split, the blade should be replaced. Splits cannot and should not be repaired. See Section 2.7 for more details.
- What may appear as a longitudinal crack at the mid point of the leading edge is not a crack at all - it is only the line parting between the upper and lower mold edges. Hudson blades are all made as one continuous laminate along leading and trailing edges.

3.2 WRINKLES

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- All TufLite® (Black), TufLite II® (White, previously Blue) and TufLite III® (White, previously Green) blades may have some degree of wrinkles in the fiberglass. These are visible as irregular shaped lines, some short and some long. Wrinkles are not harmful unless they occur in the inboard third of the blade and are transverse (crossways) to the blade. Acceptable wrinkles are defined in ES-24.29.0. If a crack appears in the center of a wrinkle, replace the blade.

3.5 LEADING EDGE EROSION

- 3.3.1 On TufLite® (Black) blades, some pitting of the leading edge may be visible, especially near the tip, after several years of operation. This depends on the effectiveness of the drift eliminators (DE) in a wet tower. This is not a blade defect. The solution would be to replace the DE or apply neoprene “boots” to the blades’ leading edges. Hudson can perform this service, preferably at our plant in Beasley, Texas. Contact Hudson for assistance.
- 3.3.2 TufLite II® (White, previously Blue) and TufLite III® (White, previously Green) blades have the patented “Tuf-Edge” molded-in anti-erosion strip. Some wearing of the paint layer near the tip may be evident but this is not wear of the fiberglass, only the paint. In some very severe cases, where large water droplets are present, some erosion could occur. Leading edge “boots” can be applied for additional protection. Contact Hudson for assistance.

3.6 ULTRA-VIOLET ATTACK

- 3.4.1 On TufLite® (Black) blades manufactured after 2003 are coated similar to TufLite II® (White, previously Blue) and TufLite III® (White, previously Green), please refer to Section 3.4.2 if blade manufactured after 2003. UV attack whitens the top skin by oxidizing the outer layer of epoxy. After several years it may appear that no epoxy is left on the top surface of the blade. The “fix” is to repaint the blades, first with an epoxy undercoat and then with a urethane topcoat. Contact Hudson for the approved materials and procedures.
- 3.4.2 TufLite II® (White, previously Blue) and TufLite III® (White, previously Green) blades have a coating of high solids urethane paint to prevent UV attack for many

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years of operation. The blades can be recoated in later years to further extend their life. Contact Hudson Products for the approved materials and procedures. Note: In some cases, the severe of the UV attack may require replacement of the blade.

3.5 RUST STREAKS

3.5.1 For TufLite II® (White, previously Blue) blades, some dark streaks can build up on the blades due to the rusting of the rivets. This is not harmful and does not indicate any structural defect. The function of the rivets is only to hold the airfoil and holder together during the initial assembly step until the joining adhesive has cured. The strength of the rivets is not a factor in maintaining blade integrity. Note: In wet cooling tower application, it is not uncommon for rust streaks to be transferred from the hub to the blades.

REV.	DESCRIPTION	DATE	APPROVED
0	Initial Release	6/20/98	
1	Copies of initial release lost. Unable to determine revisions.	10/15/92	R.C. Monroe
2	<u>Part I</u> Section 4: Deleted "Note that TUF-LITE II blades are painted with urethane as standard." <u>Part II</u> Section 1: Deleted contents of section 1 and replaced with four new bullets. Added section 6.	2/21/95	A. Pinkerton
3	Made ES 24.48 obsolete and incorporated that specification into section 1 (Definitions) & section 2 (Inspection Procedure).	12/16/96	Pat Hite
4	Section 1: Added sketch. Section 2: Rewrote inspection procedure. Section 3. Incorporated information previously in sections 3-8 into a new section 3 (Blade Defects).	4/27/98	Pat Hite
5	Para 2.4: Eliminated phrase "fuzzy or" Para 2.8: Added phrase "or if 50% or more top surface of the blade has a fuzzy texture"	5/27/04	LRS
6	Revised format and added TufLite III blades	11/10/04	CY
7	Changed T-L II and III "colors" to White, previously Blue/Green"	9/6/07	LRS
8	Updated 5-14 ft Fan H-Blade Clamp Bolt Torques (Non Lubricated), was 60ft-lb.	1/6/10	SR

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