







STRUCTURE FAILURE

AIRWORTHINESS NOTICE

VERSION : 2.0
DATE OF IMPLEMENTATION : 12-05-2010
OFFICE OF PRIME INTEREST : AIRWORTHINESS DIRECTORATE

	NAME	DESIGNATION	SIGNATURE
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TYPE OF DOCUMENT	AIRWORTHINESS NOTICE (AWNOT)		
STATUS OF DOCUMENT	CONTROLLED		

A. AUTHORITY:

A1. This Airworthiness Notice has been issued under the Authority vested in DG CAA vide Rule 4 of Civil Aviation Rules, 1994

B. PURPOSE:

B1. The purpose of this Airworthiness Notice is to specify the categories and causes of structure failure along with requirements for reporting investigation and preservation of failed structure.

C. SCOPE:

C1. This Airworthiness Notice applies to all aviation operators and maintenance organizations dealing in aircraft operation and maintenance.

D. DESCRIPTION:

D1. DEFINITION:

D1.1 A structural failure may be defined as the failure of any part of an aircraft by means of which loss of control might result. Damage by collision with external objects is not included.

D1.2 **A primary:** – type failure is one which occurs while adjacent or associated parts are intact and when a loading similar to the design loading has been applied to the failed piece. Thus, a primary – type failure of one of the wing main spars would involve the compression failure of one spar chord, and / or buckling of the spar web, and / or the tension failure of the other spar chord.

D1.3 **A secondary:** type of failure is one which occurs when the integrity of adjacent parts has been destroyed by previous failures. In general, the loading which produces such failure differs from the design loading in type. Thus, if both spar chords of a wing spar are found failed by twisting or bending forces, the failures would be secondary.

D1.4 In general, primary type failures are usually associated with the initial and subsequent in-flight failures, while the secondary type failures are more frequently associated with ground impact failures or damage.

D2. CAUSES OF STRUCTURAL FAILURES:

D2.1 In general, failures result from either:

D2.1.1 Inadequate design strength; or

D2.1.2 Excessive loads imposed; or

D2.1.3 Deterioration of static strength through fatigue or corrosion.

D2.2 Fatigue failures continue to be one of the major causes of structural failures of aircraft parts and components. In general, fatigue failures are due to either:

D2.2.1 Inadequate design; or

D2.2.2 Poor maintenance; or

D2.2.3 Defective manufacturing; or

D2.2.4 Alternating loading not anticipated by the designer.

D2.3 In addition to the three basic causes for in-flight structural failure cited above, there is a special type of failure associated with flutter. Flutter is an instability type of phenomenon involving a self –excited oscillatory system and its occurrence is dependent upon the inter-relationship of the aerodynamic forces, inertia forces and elastic forces of the system. When flutter does occur the amplitude of the oscillation may build up and extremely high loads may develop, resulting generally in structural failure of the aircraft or one of its components.

D3. **NOTIFICATION OF STRUCTURAL FAILURE:**

D3.1 When a structural failure occurs either of an engine or an airframe, the aircraft becomes unserviceable, and the owner is required to immediately notify Director Airworthiness

D4. **INVESTIGATION:**

D4.1 A structural failure is always a potential cause of an accident, therefore, Airworthiness Directorate desires, in the interest of safety, to receive an immediate and full report on every structural failure so that the cause may be ascertained and, if possible eliminated In order to avoid a repetition of similar failures.

D5. **PRESERVATION OF DEFECTIVE PARTS:**

D5.1 The defective parts constitute a portion of the most important evidence from which the cause of failure may be determined, and therefore must be held by operators for inspection by surveyor of Airworthiness Directorate.

D5.2 Defective parts must be preserved as nearly as possible in the state in which they were when the failure occurred. If the failure is of an important nature, it is desirable to make a photographic record at the first opportunity in order to preclude the chances of loss of evidence through any cause whatsoever.

D5.3 On no account any defective parts, which form a portion of the evidence in respect of structural failure, be sent out of Pakistan without the written permission of Airworthiness Directorate.

E. **EVIDENCES (ACRONYMS / RECORDS / REFERENCES):**

E1. **ACRONYMS:**

Nil

E2. **RECORDS:**

Nil

E3. **REFERENCES**

Nil

IMPLEMENTATION:

This Airworthiness Notice shall be implemented with effect from 12th May, 2010 and repeals / cancels / supersedes Airworthiness Notice No. 38 issue 1, dated 30th May, 2000.

Dated: 12th May, 2010



(Engr MUNAWAR JAMAL QURESHI)
General Manager Airworthiness (Regulation)
Dated- 12th May, 2010
File No. HQCAA/ 2233/1/38/AW



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Director Airworthiness
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for