

SAFETY RECOMMENDATION

A. N. S. V.

Prot. USCITA
N.0005115/11
Data 25/08/2011



To: European Aviation Safety Agency (EASA)
Safety Analysis and Research
Postfach 10 12 53
D-50452 Koeln, Germany

Federal Aviation Administration (FAA)
800 Independence Avenue, SW
Washington, DC 20591

Copy to: Federal Ministry for Transport, Innovation and
Technology
Radetzkystraße 2
A-1030 Vienna, Austria

ENAC
Vicedirettore generale Ing. Benedetto Marasà
Viale del Castro Pretorio, 118
00185 Roma

Subject: accident occurred on Trieste-Ronchi dei Legionari airport (LIPQ) to the Diamond DA42 “TwinStar” registration marks S5-DNE, on April 11th, 2010.

1. Synopsis.

On April 11th, 2010, a Diamond DA42 “TwinStar” (picture 1) registration marks S5-DNE, due to landing gear extension problems during approach to Portoroz airport (LJPZ), diverted to Trieste-Ronchi dei Legionari airport (LIPQ) to land on a safer runway, with the left main landing gear not down.

The aircraft stopped safely on the runway and the emergency services on the airport approached the aircraft but no action has been needed. Minor damages to the aircraft, no damages to the airport and no injuries were reported. The aircraft was moved to a parking area through the use of a little crane.



Picture 1: Diamond DA42 "TwinStar".

2. Technical investigation.

During visual inspection performed on the left main landing gear, an over-length of the related shock absorber has been noticed (P/N D60-3277-10-00, S/N 031623 34328 HEG). At the presence of the Diamond representative, the ANSV investigator asked to proceed with the component disassembly (see picture 2). The nut identified on the figure 1 as item "9" has been found completely unscrewed. Infact it has been found in the oil drained during the disassembly operation.

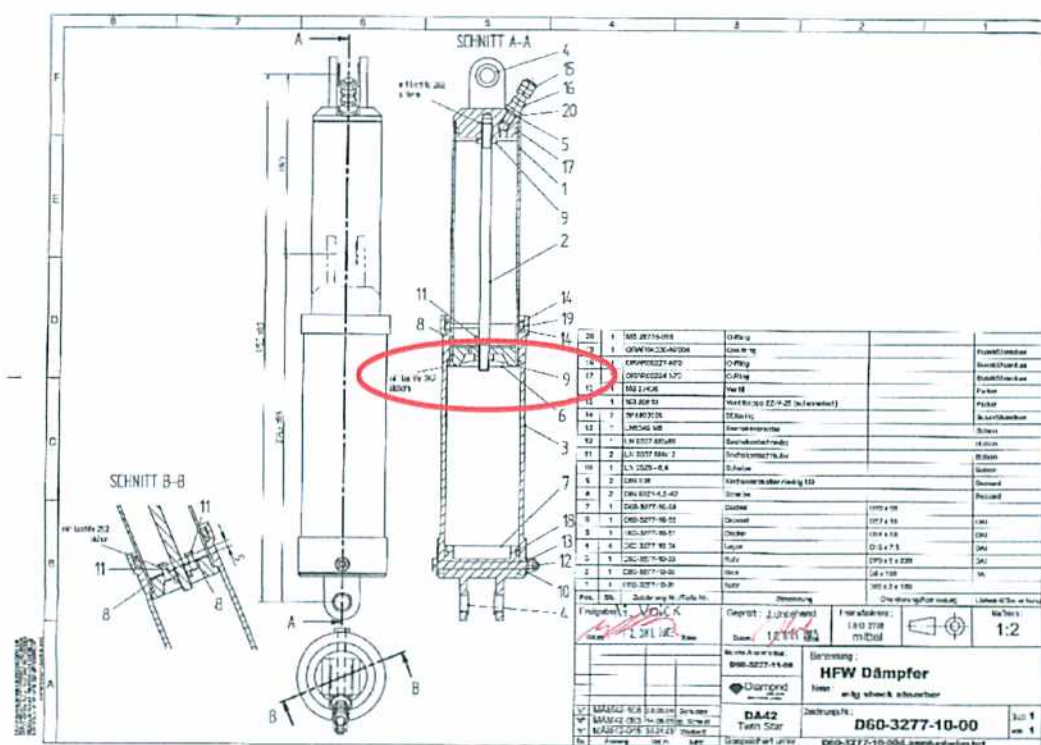


Figure 1: Main Landing Gear Dumper Scheme.

The nut loss, made the dumper longer than the project requirements, so after *last retraction* the landing gear remained locked in “up position” due to the interference between the wheel and the airframe (see picture 3).

As described by the AMM 32-10-00 (7.B.”Assemble Main Landing Gear Dumper”) of the aircraft, the installation of this nut need to «apply Loctite 262 on thread and tighten with 15 Nm (11 lb.ft.)» and the Loctite 262 data sheet contemplates its use in presence of oil of same type used in the dumper (see figure 2).

It has not been possible to realize if there was some trace of Loctite 262 on the threads by visual inspection only, so the ANSV performed on the items a microscope inspection.

LOCTITE		Worldwide Design Handbook			
Loctite 262					
Frenafilietti da media ad elevata resistenza, anaerobico, vedi capitolo 3 «Frenatura di parti filettate»					
Proprietà del prodotto allo stato liquido					
		Valori			
		Valore tipico	Intervallo tipico		
Natura chimica		Etere dimetacrilato			
Aspetto		Liquido fluorescente rosso			
Peso specifico @ 25°C		1,1			
Viscosità @ 25°C, mPa.s (cP) Brookfield RVT					
Girante 3	@ 2 giri/minuto	5.000	da 2.500 a 7.500		
	@ 20 giri/minuto	1.800	da 1.200 a 2.400		
DIN 54453, MV					
D=129 s ⁻¹ dopo t=180 secondi		400	da 250 a 550		
Punto di infiammabilità (TCC), °C		>93			
Proprietà tipiche del prodotto polimerizzato					
Proprietà fisiche					
Coefficiente di dilatazione termica, ASTM D696, K ⁻¹		80 x 10 ⁻⁶			
Coefficiente di conducibilità termica, ASTM C177, W.m ⁻¹ K ⁻¹		0,1			
Calore specifico, kJ.kg ⁻¹ K ⁻¹		0,3			
Prestazioni caratteristiche del prodotto polimerizzato (Dopo 24 ore a 22°C su bulloni e dadi M10 in acciaio)					
		Valori			
		Valore tipico	Intervallo tipico		
Coppia di primo distacco, ISO-10964, N.m (lb. in.)		22 (189)	da 14 a 29 (da 125 a 250)		
Coppia residua, ISO-10964, N.m (lb. in.)		32 (275)	da 17 a 46 (da 150 a 300)		
Coppia di allentamento, DIN 54454, N.m (lb. in.)		38 (330)	da 25 a 50 (da 220 a 440)		
Coppia massima residua, DIN 54454, N.m (lb. in.)		40 (350)	da 25 a 55 (da 220 a 490)		
Resistenza alle sostanze chimiche ed ai solventi Provino invecchiato alle condizioni indicate e provato a 22°C					
Procedura di prova	Coppia di allentamento secondo, DIN 54454				
Substrato	Dadi e bulloni M10 zinco fosfatato				
Polimerizzazione	1 settimana a 22°C				
Solvente	Temp.	% di resistenza iniziale dopo			
		100 ore	500 ore	1000 ore	5000 ore
Olio per motori	125°C	85	85	75	75
Benzina con piombo	22°C	100	100	100	100
Liquido per freni	22°C	100	100	100	100
Acqua Glicole (50% / 50%)	87°C	100	85	85	85
Alcool etilico	22°C	95	95	95	95
Acetone	22°C	95	95	95	95

Figure 2: Loctite 262 data sheet.

The microscope analysis showed the presence of “red residual” on the threads of item “2” in the position of item “9”.

FT-IR spectrum analysis on this “red residual” confirm that their chemical characteristics are compatible and comparable with Loctite 262.



Picture 2: left main landing gear shock absorber disassembled.



Picture 3: interference signs on the airframe close to the left main landing gear.

The analysis have demonstrated that the Loctite 262 had been applied on the item “9” but we cannot be sure if it has been tightened as prescribed by the AMM.

In addition the Aircraft Maintenance Manual prescribes to disassembly the shock absorber every 2000 fh (05-20-00 Scheduled Maintenance Checks), while the aircraft has completed about 700 fh (TSN) and the shock absorber was never replaced or disassembled since new.

3. Conclusion.

The event was due to the unscrew of the nut (item “9” on figure 1) that made the shock absorber longer than the project requirements.

The analysis on the component demonstrates that the Loctite 262 was applied as prescribed by the AMM.

There is no way to understand if the thread has been tightened as prescribed by the AMM.

4. Recommendation.

Addressee 1: EASA, Safety Analysis and Research, Postfach 10 12 53, D-50452 Koeln, Germany.

Addressee 2: FAA, 800 Independence Avenue, SW Washington, DC 20591.

Text.

The investigation and the analysis performed demonstrates that the method chosen by Designer to lock the item “9” on the figure 1 appears to be not adequate. In addition it is not possible to inspect it without the removal and disassembly of the whole shock absorber.

On April 2011 the Designer issued the “Recommended Service Bulletin RSB 42-089/1” in order to change a seal on the dumper to get «*more durability in a greater temperature range*». It includes the replacement of the nut mentioned above, with a self locking nut (LN9348), installed with the use of Loctite 262. So the locking system we are speaking about has been just improved. This confirm that the only use of Loctite 262 has been considered not sufficient by Designer.

ANSV - considering the consequences of a main landing gear failure during landing, considering the use of these aircrafts for training purposes that increases the number of landing for each flight (go around and landing training), considering that the “nut” replacement stated on the RSB 42-089/1 is included in another modification and not correctly evidenced to the Operators/Owners - recommends EASA and FAA that:

- an additional inspection should be asked as soon as possible to the Operators/Owner of the aircraft now in operation, in order to check the component for the installation of the item “9” - figure 1, on all dumpers not yet modified as per RSB 42-089/1 (ANSV-14/351-10/1/A/11);
- the different choice on the nut locking method stated on the RSB 42-089/1 should become “mandatory” since the previous solution adopted by Designer (application of Loctite 262 only) appears to be not sufficient at all (ANSV-15/351-10/2/A/11).

President of ANSV
(Prof. Bruno Franchi)

