Exemption No. 9495

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
KANSAS CITY, MO 64106

In the matter of the petition of

CESSNA AIRCRAFT COMPANY

for an exemption from Title 14 CFR Part 23, § 23.473, 23.477, 23.479, 23.481, 23.483, 23.493, 23.723, 23.725, 23.726, 23.727 and C23.1, Appendix C of Title 14, Code of Federal Regulations

Regulatory Docket No. FAA-2006-26279

GRANT OF EXEMPTION

By letter dated October 30, 2006, Mr. Kim Hackett, DOA Administrator, Cessna Aircraft Company, One Cessna Boulevard, Wichita, KS 67277-7704 petitioned the Federal Aviation Administration (FAA) on behalf of Cessna, for an exemption from §§ 23.473, 23.477, 23.479, 23.481, 23.483, 23.493, 23.723, 23.725, 23.726, 23.727, and C23.1, Appendix C of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would allow the Cessna Model 525C to adhere to ground load conditions required by a 14 CFR Part 25 design basis.

The petitioner requests relief from the following regulations:

Sections 23.473, 23.477, 23.479, 23.481, 23.483, 23.493, 23.723, 23.725, 23.726, 23.727, and C23.1, Appendix C of Title 14, Code of Federal Regulations**.** These sections pertain to landing gear loads and associated airframe loads. If this petition is granted, it would permit these airplanes to be certificated with parallel rules of Title 14 CFR part 25.

The petitioner supports its request with the following information:

The petitioner states:

"Rationale: 14 CFR 23 Ground Loads were developed for light, entry level aircraft. Typically, this type of aircraft is flown by student pilots or pilots with skill levels less than those of transport pilots. 14 CFR 23 Ground Loads are conservative by only allowing 2/3g with lift relief when calculating applied landing gear loads. Ground Loads developed under 14 CFR 25 were written for large, transport category aircraft. Transport Category Aircraft are flown by pilots with more experience and higher skill levels than those typical of light, entry level aircraft. 14 CFR 25 Ground Loads specify the use of 1g wing lift relief when developing landing gear loads. By allowing the use of 1g lift as compared to 2/3g wing lift (which allows for a stall landing), the reduction in landing loads results in an associated reduction in weight for both the landing gear and adjoining aircraft structure.

"Equivalent Level of Safety: By applying the ground load requirements of 14 CFR 25, combined with the type rating requirement for pilots of the Model 525C, an equivalent level of safety exists with the ground load requirements of 14 CFR 23. The type rating requirements for pilots of the Model 525C aircraft will ensure that the pilot experience and skill levels will be comparable with those pilots of large transport category aircraft. Since the Model 525C aircraft will be flown and landed on paved runways, in a manner comparable to transport category aircraft, the ground loads defined in 14 CFR 25 are more appropriate for the Model 525C.

"Public Interest: Reduced ground loads associated with 14 CFR 25 versus 14 CFR 23 will result in an overall weight reduction of the landing gear and its associated adjoining aircraft structure. This weight reduction requires less fuel to fly a given payload on a typical mission. This serves the public interest by conserving fuel, reducing operating cost, and reducing exhaust emissions.

"The overall aircraft weight reduction due to the 14 CFR 23 exemption is estimated to be 36 pounds. A 36 pound reduction per aircraft can provide a 0.24 pound fuel savings over a typical Model 525C flight. Based on an estimated business jet usage of approximately 495 flights per year, this corresponds to an estimated annual fuel savings of 118.8 pounds per aircraft. With a conservatively estimated fleet size of 533 aircraft, over the next decade, this would yield an overall fuel savings of 36,320 pounds per year."

CURRENT 14 CFR23	PROPOSED EXEMPTION REQUIREMENT 31May07	MAJOR DIFFERENCES BETWEEN REGULATION AND PROPOSAL	HOW CESSNA WILL MITIGATE DIFFERENCES
23.473 Ground load conditions and assumptions. (a) The ground load requirements of this subpart must be complied with at the design maximum weight except that §§23.479, 23.481, and 23.483 may be complied with at a design landing weight (the highest weight for landing conditions at the maximum descent velocity) allowed under paragraphs (b) and (c) of this section.	**Ground load conditions and assumptions.** The ground load requirements of this subpart must be complied with at the design maximum weight except that requirements in paragraph “Landing load conditions and assumptions”, “Level landing conditions”, “Tail-down conditions” and “One-wheel landing condition” may be complied with at a design landing weight (the highest weight for landing conditions at the maximum descent velocity) allowed under paragraphs (b) and (c) of paragraph “Landing load conditions and assumptions”.	Proposed requirement same as paragraph (a) of regulation.	No change
(b) The design landing weight may be as low as— (1) 95 percent of the maximum weight if the minimum fuel capacity is enough for at least one-half hour of operation at maximum continuous power plus a capacity equal to a fuel weight which is the difference between the design maximum weight and the design landing weight; or (2) The design maximum weight less the weight of 25 percent of the total fuel capacity. (c) The design landing weight of a multiengine airplane may be less than that allowed under paragraph (b) of this section if— (1) The airplane meets the one-engine-inoperative climb requirements of §23.67(b)(1) or (c); and (2) Compliance is shown with the fuel jettisoning system requirements of §23.1001.	**Landing load conditions and assumptions** (a) For the landing conditions specified herein; that is, level landing, tail-down landing, one-wheel landing the following apply: (b) The design landing weight may be as low as— (1) 95 percent of the maximum weight if the minimum fuel capacity is enough for at least one-half hour of operation at maximum continuous power plus a capacity equal to a fuel weight which is the difference between the design maximum weight and the design landing weight; or (2) The design maximum weight less the weight of 25 percent of the total fuel capacity. (c) The design landing weight of a multiengine airplane may be less than that allowed under paragraph (b) of this section if— (1) The airplane meets the one-engine-inoperative climb requirements of §23.67(b)(1) or (c); and (2) Compliance is shown with the fuel jettisoning system requirements of §23.1001.	Proposed requirement retains the definition of the design landing weight as the regulation.	No change
(d) The selected limit vertical inertia load factor at the center of gravity of the airplane for the ground load conditions prescribed in this subpart may not be less than that which would be obtained when landing with a descent velocity (*V*), in feet per second, equal to 4.4 (W/S)1/4, except that this velocity need not be more than 10 feet per second and may not be less than seven feet per second.	(d) For the landing conditions specified herein the airplane is assumed to contact the ground— (1) In the attitudes defined in paragraph “Level Landing Conditions” and “Tail-down Landing Conditions”; (2) With a limit descent velocity of 10 fps at the design landing weight (the maximum weight for landing conditions at maximum descent velocity); and	Proposed requirement specifies 10fps landing at design landing weight and 6 fps at design maximum weight.	Equivalent
	(3) With a limit descent velocity of 6 fps at the design maximum weight.		More specific

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(e) Wing lift not exceeding two-thirds of the weight of the airplane may be assumed to exist throughout the landing impact and to act through the center of gravity. The ground reaction load factor may be equal to the inertia load factor minus the ratio of the above assumed wing lift to the airplane weight. (f) If energy absorption tests are made to determine the limit load factor corresponding to the required limit descent velocities, these tests must be made under §23.723(a). (g) No inertia load factor used for design purposes may be less than 2.67, nor may the limit ground reaction load factor be less than 2.0 at design maximum weight, unless these lower values will not be exceeded in taxiing at speeds up to takeoff speed over terrain as rough as that expected in service. [Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–7, 34 FR 13090, Aug. 13, 1969; Amdt. 23–28, 47 FR 13315, Mar. 29, 1982; Amdt. 23–45, 58 FR 42160, Aug. 6, 1993; Amdt. 23–48, 61 FR 5147, Feb. 9, 1996]	(e) Airplane lift, not exceeding airplane weight, may be assumed unless the presence of systems or procedures significantly affects the lift. (f) The method of analysis of airplane and landing gear loads must take into account at least the following elements: (1) Landing gear dynamic characteristics. (2) Spin-up and springback. (3) Rigid body response. (4) Structural dynamic response of the airframe, if significant. (d) The landing gear dynamic characteristics must be validated by tests as defined in paragraph "Shock absorption tests".	Proposed requirement airplane lift not exceeding weight vs regulation wing lift not exceeding two-thirds weight of airplane. The proposed requirement would require inclusion of the landing gear dynamic characteristics, rational spin-up load and spring back load as well as rigid body response of the airplane. Structural dynamic effects on the gear loads and airframe load will be investigated and included if significant. The dynamic characteristics of the landing gear analytical models will be validated by drop tests. The regulation requires only selection of a limit vertical inertia load factor.	Aircraft will be flown by pilots with more experience and higher skill levels than those typical of light, entry level aircraft More rigorous
23.477 Landing gear arrangement. Sections 23.479 through 23.483, or the conditions in appendix C, apply to airplanes with conventional arrangements of main and nose gear, or main and tail gear.	**Landing gear arrangement.** Level landing, tail-down landing and one-wheel landing conditions apply to airplanes with conventional arrangements of main and nose gears, when normal operating techniques are used.	Proposed requirement eliminates option of using Appendix C of the regulation. (Note Appendix C of regulation is deleted from proposed requirement).	More specific

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23.479 Level landing conditions. (a) For a level landing, the airplane is assumed to be in the following attitudes: (1) For airplanes with tail wheels, a normal level flight attitude. (2) For airplanes with nose wheels, attitudes in which— (i) The nose and main wheels contact the ground simultaneously; and (ii) The main wheels contact the ground and the nose wheel is just clear of the ground. The attitude used in paragraph (a)(2)(i) of this section may be used in the analysis required under paragraph (a)(2)(ii) of this section. (b) When investigating landing conditions, the drag components simulating the forces required to accelerate the tires and wheels up to the landing speed (spin-up) must be properly combined with the corresponding instantaneous vertical ground reactions, and the forward-acting horizontal loads resulting from rapid reduction of the spin-up drag loads (spring-back) must be combined with vertical ground reactions at the instant of the peak forward load, assuming wing lift and a tire-sliding coefficient of friction of 0.8. However, the drag loads may not be less than 25 percent of the maximum vertical ground reactions (neglecting wing lift).	**Level landing conditions.** (a) In the level attitude, the airplane is assumed to contact the ground at forward velocity components, ranging from V_{L1} to 1.25 V_{L2} parallel to the ground under the conditions prescribed in the "Landing load conditions and assumptions" with - (1) V_{L1} equal to V_{S0} (TAS) at the appropriate landing weight and in standard sea level conditions; and (2) V_{L2} equal to V_{S0} (TAS) at the appropriate landing weight and altitudes in a hot- day temperature of 41 degrees F. above standard. (3) The effects of increased contact speeds must be investigated if approval of downwind landings exceeding 10 knots if desired. (b) For the level landing attitude for airplanes with nose wheels, shown in Figure 2 of Appendix A of this part, the conditions specified in this section must be investigated assuming the following attitudes: (1) An attitude in which the main wheels are assumed to contact the ground with the nose wheel just clear of the ground; and (2) If reasonably attainable at the specified descent and forward velocities, an attitude in which the nose and main wheels are assumed to contact the ground simultaneously. .	Proposed requirement specifies speed range that must be analyzed to ensure identification of critical gear loads for level attitude.	More specific

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(c) In the absence of specific tests or a more rational analysis for determining the wheel spin-up and spring-back loads for landing conditions, the method set forth in appendix D of this part must be used. If appendix D of this part is used, the drag components used for design must not be less than those given by appendix C of this part. (d) For airplanes with tip tanks or large overhung masses (such as turbo-propeller or jet engines) supported by the wing, the tip tanks and the structure supporting the tanks or overhung masses must be designed for the effects of dynamic responses under the level landing conditions of either paragraph (a)(1) or (a)(2)(ii) of this section. In evaluating the effects of dynamic response, an airplane lift equal to the weight of the airplane may be assumed. [Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–17, 41 FR 55464, Dec. 20, 1976; Amdt. 23–45, 58 FR 42160, Aug. 6, 1993]	(c) In addition to the loading conditions prescribed in paragraph (a) of this section, but with maximum vertical ground reactions calculated from paragraph (a), the following apply: (1) The landing gear and directly affected attaching structure must be designed for the maximum vertical ground reaction combined with an aft acting drag component of not less than 25% of this maximum vertical ground reaction. (2) The most severe combination of loads that are likely to arise during a lateral drift landing must be taken into account. In absence of a more rational analysis of this condition, the following must be investigated: (i) A vertical load equal to 75% of the maximum ground reaction of paragraph “Landing load conditions and assumptions” must be considered in combination with a drag and side load of 40% and 25% respectively of that vertical load. (ii) The shock absorber and tire deflections must be assumed to be 75% of the deflection corresponding to the maximum ground reaction of paragraph “Landing load conditions and assumptions” (d)(2). This load case need not be considered in combination with flat tires. (3) The combination of vertical and drag components is considered to be acting at the wheel axle centerline		

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23.481 Tail down landing conditions. (a) For a tail down landing, the airplane is assumed to be in the following attitudes: (1) For airplanes with tail wheels, an attitude in which the main and tail wheels contact the ground simultaneously. (2) For airplanes with nose wheels, a stalling attitude, or the maximum angle allowing ground clearance by each part of the airplane, whichever is less. (b) For airplanes with either tail or nose wheels, ground reactions are assumed to be vertical, with the wheels up to speed before the maximum vertical load is attained.	**Tail-down landing conditions.** (a) In the tail-down attitude, the airplane is assumed to contact the ground at forward velocity components, ranging from V_{L1} to V_{L2}, parallel to the ground, as is subjected to the load factors prescribed in the "Ground load conditions and assumptions" paragraph (a)(1) with - (1) VL_1 equal to VS_0 (TAS) at the appropriate landing weight and in standard sea level conditions; and (2) VL_2 equal to VS_0 (TAS) at the appropriate landing weight and altitudes in a hot- day temperature of 41 degrees F. above standard. (3) The combination of vertical and drag components considered to be acting at the main wheel axle centerline. (b) For the tail-down landing condition for airplanes with nose wheels, the airplane is assumed to be at an attitude corresponding to either the stalling angle or the maximum angle allowing clearance with the ground by each part of the airplane other than the main wheels, in accordance with figure 3 of appendix A, whichever is less.	Proposed requirement specifies speed range that must be analyzed to ensure identification of critical gear loads for tail down attitudes. Regulation does not require drag loads for tail down attitude.	More rigorous
23.483 One-wheel landing conditions. For the one-wheel landing condition, the airplane is assumed to be in the level attitude and to contact the ground on one side of the main landing gear. In this attitude, the ground reactions must be the same as those obtained on that side under §23.479.	**One-wheel landing conditions.** For the one-wheel landing condition, the airplane is assumed to be in the level attitude and to contact the ground on one side of the main landing gear, in accordance with figure 4 of appendix A. In this attitude - (a) The ground reactions must be the same as those obtained on that side under the "Level landing condition" paragraph (b)(2) and (b) Each unbalanced external load must be reacted by airplane inertia in a rational or conservative manner.	Proposed requirement equivalent to regulation.	More specific

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No existing requirement.	**Taxi, takeoff and landing roll.** Within the range of appropriate ground speeds and approved weights, the airplane structure and landing gear are assumed to be subjected to loads not less than those obtained when the aircraft is operating over the roughest ground that may reasonably be expected in normal operation.	Proposed requirement will be addressed by a taxi analysis over the runway profile given in AC25.491	More rigorous
23.493 Braked roll conditions. Under braked roll conditions, with the shock absorbers and tires in their static positions, the following apply: (a) The limit vertical load factor must be 1.33. (b) The attitudes and ground contacts must be those described in §23.479 for level landings. (c) A drag reaction equal to the vertical reaction at the wheel multiplied by a coefficient of friction of 0.8 must be applied at the ground contact point of each wheel with brakes, except that the drag reaction need not exceed the maximum value based on limiting brake torque.	**Braked roll conditions.** Under braked roll conditions, with the shock absorbers and tires in their static positions, the following apply: (a) The limit vertical load factor must be 1.33. (b) The following two attitudes, in accordance with figure 6 of appendix A, must be considered: (1) The level attitude with the wheels contacting the ground and the loads distributed between the main and nose gear. Zero pitching acceleration is assumed. (2) The level attitude with only the main gear contacting the ground and with the pitching moment resisted by angular acceleration. (c) A drag reaction equal to the vertical reaction at the wheel multiplied by a coefficient of friction of 0.8 must be applied at the ground contact point of each wheel with brakes, except that the drag reaction need not exceed the maximum value based on limiting brake torque.	Proposed requirement equivalent to regulation.	More specific

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23.723 Shock absorption tests. (a) It must be shown that the limit load factors selected for design in accordance with §23.473 for takeoff and landing weights, respectively, will not be exceeded. This must be shown by energy absorption tests except that analysis based on tests conducted on a landing gear system with identical energy absorption characteristics may be used for increases in previously approved takeoff and landing weights. (b) The landing gear may not fail, but may yield, in a test showing its reserve energy absorption capacity, simulating a descent velocity of 1.2 times the limit descent velocity, assuming wing lift equal to the weight of the airplane. [Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23–23, 43 FR 50593, Oct. 30, 1978; Amdt. 23–49, 61 FR 5166, Feb. 9, 1996]	**Shock absorption tests.** (a) The analytical representation of the landing gear dynamic characteristics that is used in determining the landing loads must be validated by energy absorption tests. A range of tests must be conducted to ensure that the analytical representation is valid for the design conditions specified in "Ground load conditions and assumptions" paragraph. (1) The configurations subjected to energy absorption tests at limit design conditions must include at least the design landing weight or the design takeoff weight, whichever produces the greater value of landing impact energy. (2) The test attitude of the landing gear unit and the application of appropriate drag loads during the test must simulate the airplane landing conditions in a manner consistent with the development of rational or conservative limit loads. (b) The landing gear may not fail in a test, demonstrating its reserve energy absorption capacity, simulating a descent velocity of 12 fps at design landing weight, assuming airplane lift not greater than airplane weight acting during the landing impact. (c) In lieu of the tests prescribed in this section, changes in previously approved design weights and minor changes in design may be substantiated by analyses based on previous tests conducted on the same basic landing gear system that has similar energy absorption characteristics.	Proposed requirements for shock absorption tests provide data for validation of the analytical model used in deriving the landing gear and airframe loads.	Removal of specific requirement to test to establish design limit load factors is compensated by requiring increased range of tests at specific configurations and conditions to validate an analytical simulation.

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23.725 Limit drop tests. (a) If compliance with §23.723(a) is shown by free drop tests, these tests must be made on the complete airplane, or on units consisting of wheel, tire, and shock absorber, in their proper relation, from free drop heights not less than those determined by the following formula: *h* (inches)=3.6 (*W/S*)1/2 However, the free drop height may not be less than 9.2 inches and need not be more than 18.7 inches. (b) If the effect of wing lift is provided for in free drop tests, the landing gear must be dropped with an effective weight equal to $W_e = W\frac{\left[h+(1-L)d\right]}{(h+d)}$ where— *W* e=the effective weight to be used in the drop test (lbs.); *h* =specified free drop height (inches); *d* =deflection under impact of the tire (at the approved inflation pressure) plus the vertical component of the axle travel relative to the drop mass (inches); *W*=*W* M for main gear units (lbs), equal to the static weight on that unit with the airplane in the level attitude (with the nose wheel clear in the case of nose wheel type airplanes); *W*=*W* T for tail gear units (lbs.), equal to the static weight on the tail unit with the airplane in the tail-down attitude; *W*=*W* N for nose wheel units lbs.), equal to the vertical component of the static reaction that would exist at the nose wheel, assuming that the mass of the airplane acts at the center of gravity and exerts a force of 1.0 *g* downward and 0.33 *g* forward; and *L*= the ratio of the assumed wing lift to the airplane weight, but not more than 0.667.	**Limit drop tests.** (a) If compliance with the "Shock absorption tests" paragraph (a) is shown by free drop tests, these tests must be made on the complete airplane, or on units consisting of a wheel, tire, and shock absorber, in their proper positions, from free drop heights not less than - (1) 18.7 inches for the design landing weight conditions; and (2) 6.7 inches for the design takeoff weight conditions. (b) If airplane lift is simulated by air cylinders or by other mechanical means, the weight used for the drop must be equal to W. If the effect of airplane lift is represented in free drop tests by an equivalent reduced mass, the landing gear must be dropped with an effective mass equal to $W_e = W\frac{\left[h+(1-L)d\right]}{(h+d)}$ where - *W* e = the effective weight to be used in the drop test (lbs.); h = specified free drop height (inches): d = deflection under impact of the tire (at the approved inflation pressure) plus the vertical component of the axle travel relative to the drop mass (inches); W = W_m for main gear units (lbs.), equal to the static weight on that unit with the airplane in the level attitude (with the nose wheel clear in the case of nose wheel type airplanes); W = W_N for nose wheel units (lbs.), equal to the vertical component of the static reaction that would exist at the nose wheel, assuming that the mass of the airplane acts at the center of gravity and exerts a force of 1.0g downward and 0.25g forward; and L = the ratio of the assumed airplane lift to the airplane weight, but not more than 1.0 (c) The drop test attitude of the landing gear unit and the application of appropriate drag loads during the test must simulate the airplane landing conditions in a manner consistent with the development of a rational or conservative limit loads. (d) The value of d used in the computation of W_e in paragraph (b) of this section may not exceed the value actually obtained in the drop test.	Proposed requirement for limit drop tests will use the same test methods as required by regulation except lift can be assumed to be 1g and Wn is computed assuming an Nx = 0.25 vs Nx= 0.33.	Aircraft will be flown by pilots with more experience and higher skill levels than those typical of light, entry level aircraft

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(c) The limit inertia load factor must be determined in a rational or conservative manner, during the drop test, using a landing gear unit attitude, and applied drag loads, that represent the landing conditions. (d) The value of *d* used in the computation of *W* ein paragraph (b) of this section may not exceed the value actually obtained in the drop test. (e) The limit inertia load factor must be determined from the drop test in paragraph (b) of this section according to the following formula: $$n = n_j \frac{W_e}{W} + L$$ where— *n* j=the load factor developed in the drop test (that is, the acceleration (*dv/dt*) in *g* s recorded in the drop test) plus 1.0; and *W*e, *W*, and *L* are the same as in the drop test computation. (f) The value of *n* determined in accordance with paragraph (e) may not be more than the limit inertia load factor used in the landing conditions in §23.473. [Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–7, 34 FR 13091, Aug. 13, 1969; Amdt. 23–48, 61 FR 5148, Feb. 9, 1996]			

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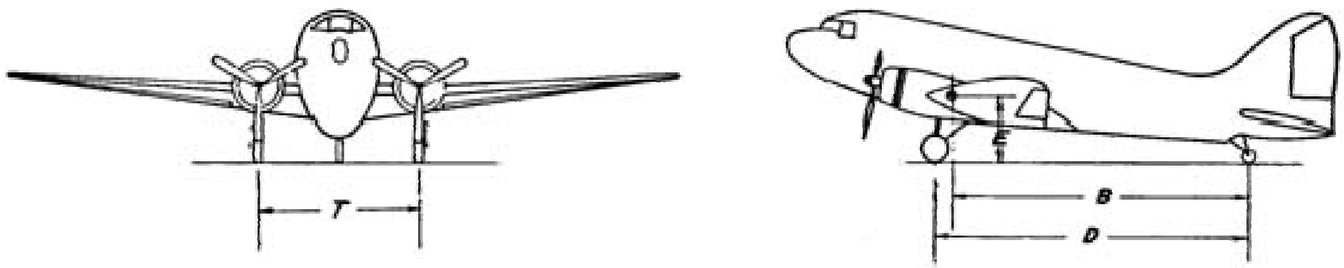
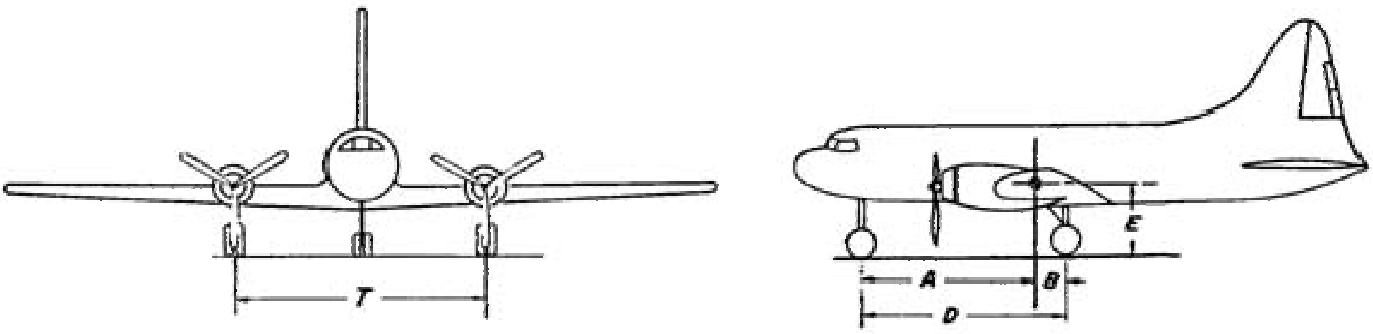
23.726 Ground load dynamic tests. (a) If compliance with the ground load requirements of §§23.479 through 23.483 is shown dynamically by drop test, one drop test must be conducted that meets §23.725 except that the drop height must be— (1) 2.25 times the drop height prescribed in §23.725(a); or (2) Sufficient to develop 1.5 times the limit load factor. (b) The critical landing condition for each of the design conditions specified in §§23.479 through 23.483 must be used for proof of strength. [Amdt. 23–7, 34 FR 13091, Aug. 13, 1969]	**Ground load dynamic tests** Means of compliance deleted	Proposed requirement eliminates the regulation criteria as a means of compliance.	More restrictive
23.727 Reserve energy absorption drop test. (a) If compliance with the reserve energy absorption requirement in §23.723(b) is shown by free drop tests, the drop height may not be less than 1.44 times that specified in §23.725. (b) If the effect of wing lift is provided for, the units must be dropped with an effective mass equal to *W* e= *Wh/(h+d),* when the symbols and other details are the same as in §23.725. [Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–7, 34 FR 13091, Aug. 13, 1969]	**Reserve energy absorption drop tests.** (a) If compliance with the reserve energy absorption condition specified in the "Shock absorption tests" paragraph (b) is shown by free drop tests, the drop height may not be less than 27 inches. (b) If airplane lift is simulated by air cylinders or by other mechanical means, the weight used for the drop must be equal to W. If the effect of airplane lift is represented in free drop tests by an equivalent reduced mass, the landing gear must be dropped with an effective mass, *W*e= *Wh/(h+d)* where the symbols and other details are the same as in the "Limit drop tests" paragraph (b). (c) neither shock strut nor the tire should bottom during the reserve energy test.	Proposed requirement equivalent to regulation with added requirement that shock strut and tire should not bottom during reserve energy tests.	More rigorous

FIGURE 1—Basic landing gear dimension data.



TAIL WHEEL 1..E



NOSE WHEEL TYPE

FIGURE 2—Level landing.

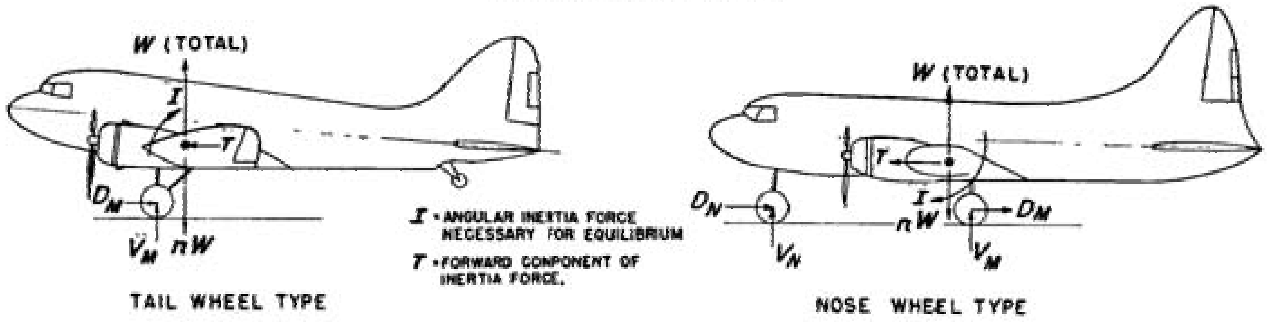
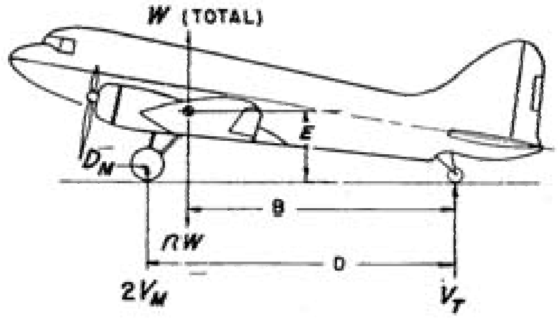
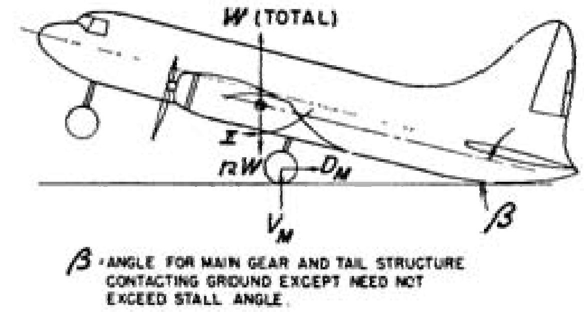


FIGURE 3—Tail-down landing.

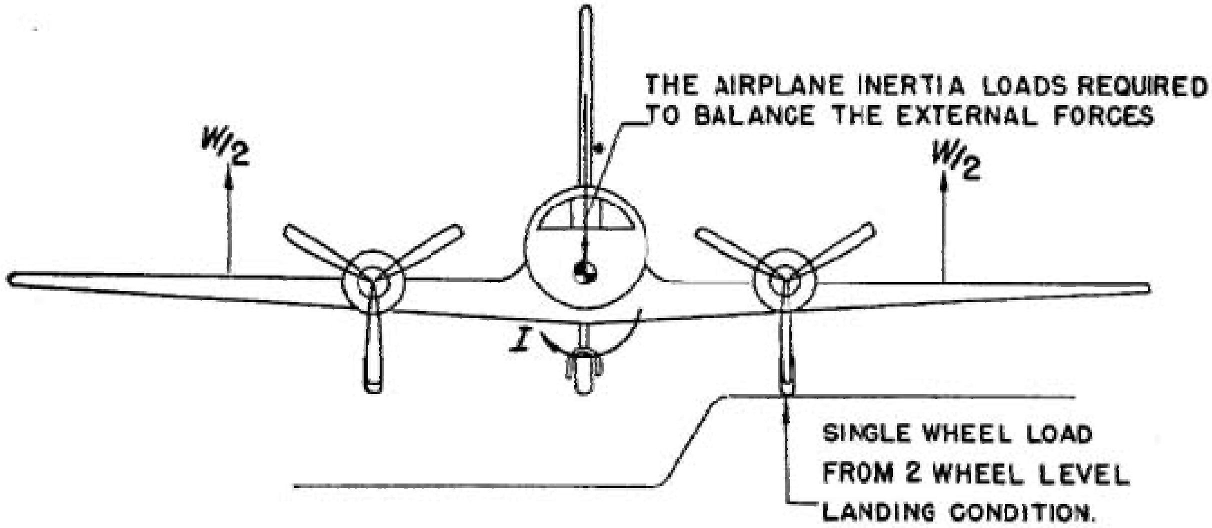


TAIL WHEEL TYPE



NOSE WHEEL TYPE

FIGURE 4—One-wheel landing.



NOSE OR TAIL WHEEL TYPE

FIGURE 5—Lateral drift landing.

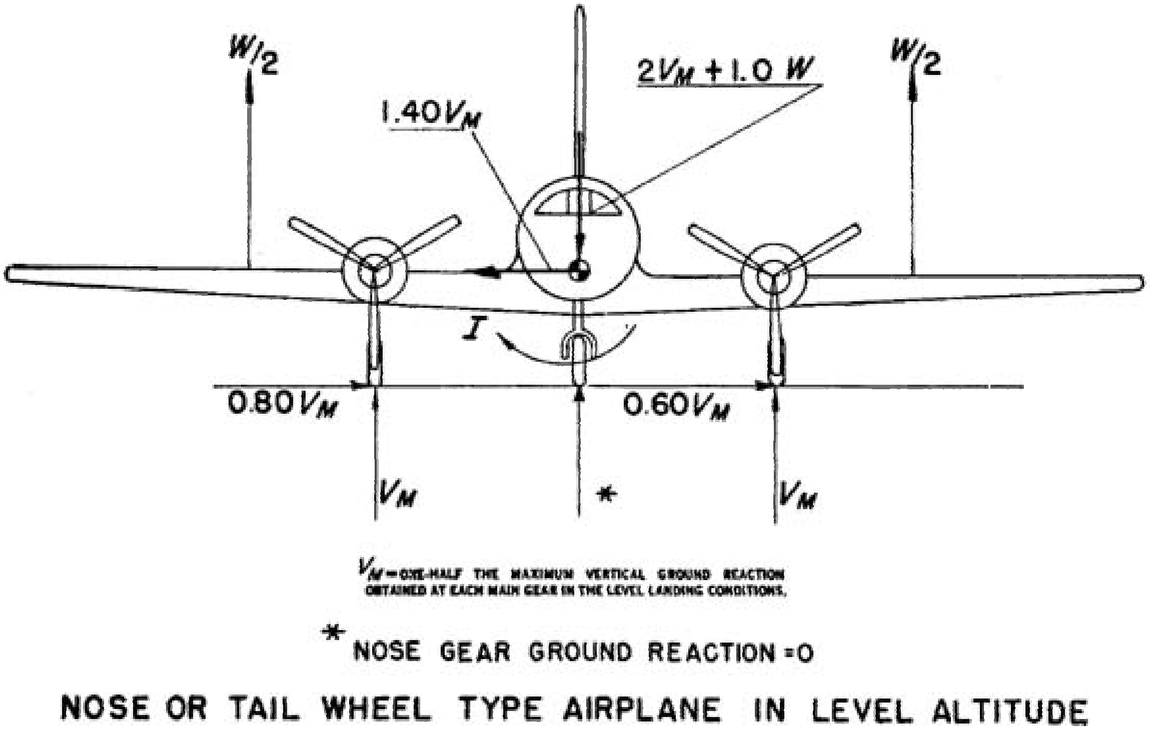


FIGURE 6—Braked roll.

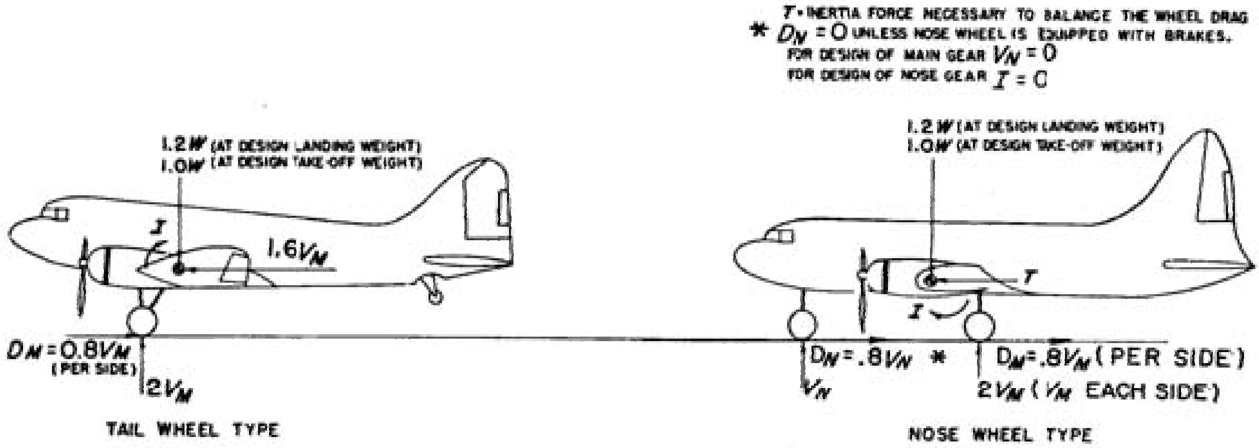


FIGURE 7—Ground turning.

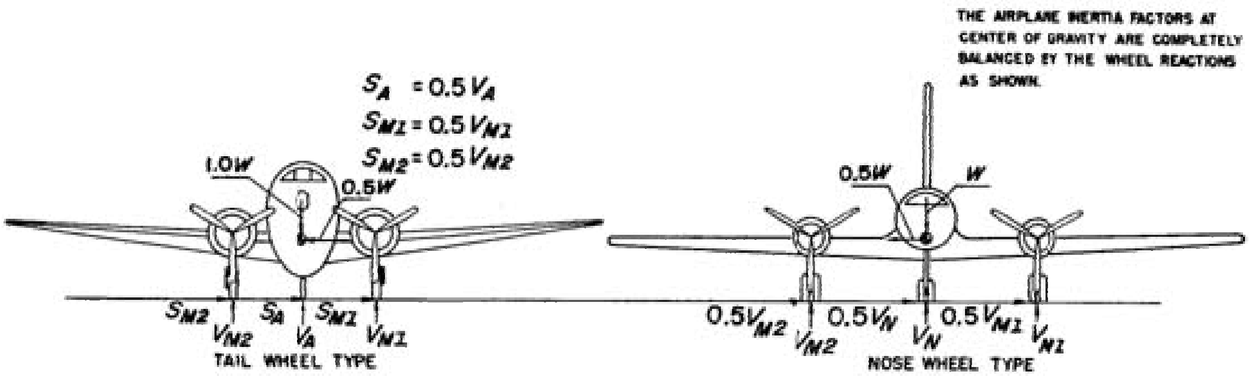
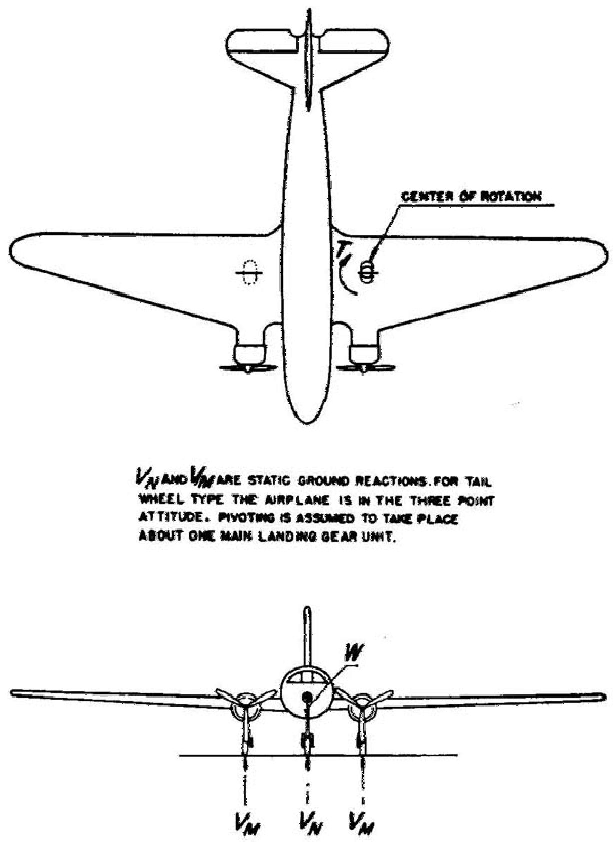


Figure 8—Pivoting, nose or tail wheel type.



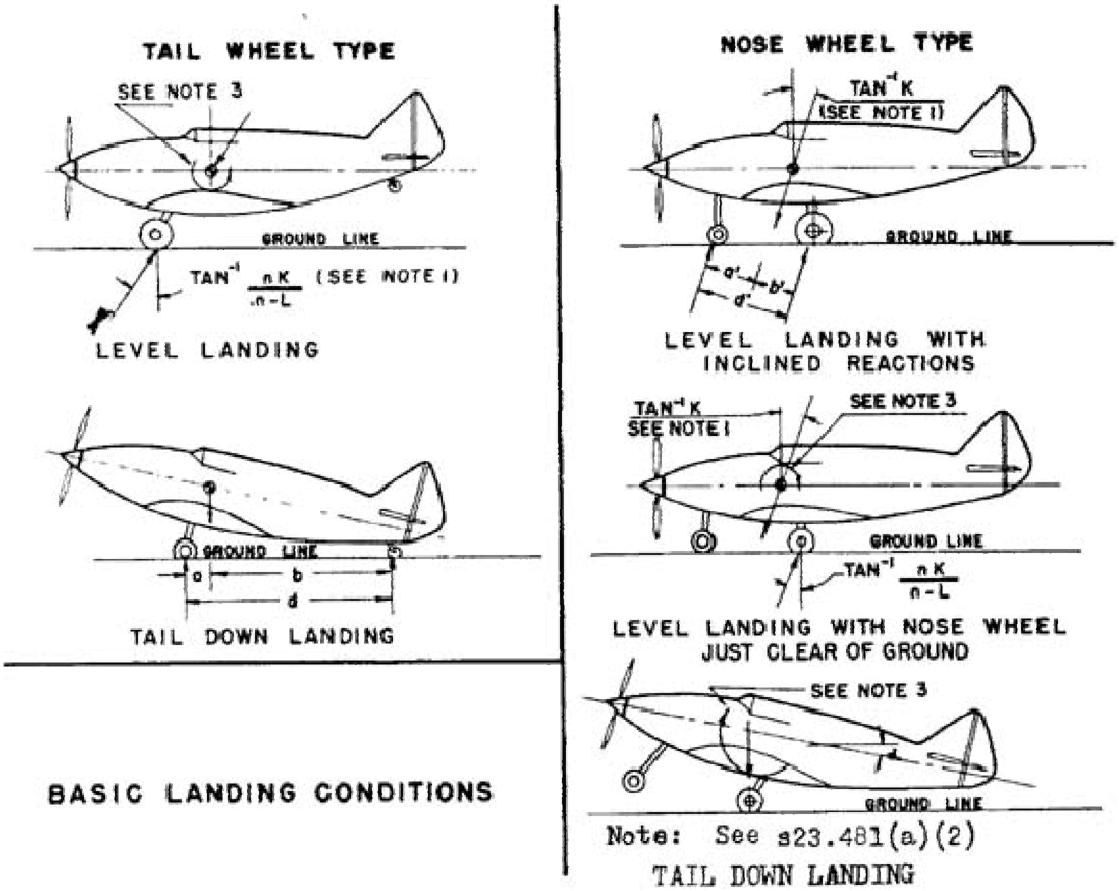
Sec. C23.1

Basic landing conditions

Condition	Tail wheel type		Nose wheel type		
	Level landing	Tail-down landing	Level landing with inclined reactions	Level landing with nose wheel just clear of ground	Tail-down landing
Reference section	23.479(a)(1)	23.481(a)(1)	23.479(a)(2)(i)	23.479(a)(2)(ii)	23.481(a)(2) and (b)
Vertical component at c.g.	nW	nW	nW	nW	nW
Fore and aft component at c.g.	KnW	0	KnW	KnW	0
Lateral component in either direction at c.g.	0	0	0	0	0
Shock absorber extension (hydraulic shock absorber)	Note (2)	Note (2)	Note (2)	Note (2)	Note (2)
Shock absorber deflection (rubber or spring shock absorber)	100%	100%	100%	100%	100%
Tire deflection	Static	Static	Static	Static	Static
Main wheel loads (both wheels)- $\begin{cases} V_r \\ D_r \end{cases}$	(n-L)W KnW	(n-L)Wb/d 0	(n-L)Wa'/d' KnWa'/d'	(n-L)W KnW	(n-L)W 0
Tail (nose) wheel loads- $\begin{cases} V_f \\ D_f \end{cases}$	0 0	(n-L)Wa/d 0	(n-L)Wb'/d' KnWb'/d'	0 0	0 0
Notes	(1), (3), and (4)	(4)	(1)	(1), (3), and (4)	(3) and (4)

Note (1). *K* may be determined as follows: *K* = 0.25 for *W* = 3,000 pounds or less; *K* = 0.33 for *W* = 6,000 pounds or greater, with linear variation of K between these weights.
Note (2). For the purpose of design, the maximum load factor is assumed to occur throughout the shock absorber stroke from 25 percent deflection to 100 percent deflection unless otherwise shown and the load factor must be used with whatever shock absorber extension is most critical for each element of the landing gear.
Note (3). Unbalanced moments must be balanced by a rational or conservative method.
Note (4). *L* is defined in Sec. 23.725(b).
[Note (5). *n* is the limit inertia load factor, at the c.g. of the airplane, selected under 23.473(d), (f), and (g).**]**

Basic Landing Conditions


TAIL WHEEL TYPE
SEE NOTE 3
GROUND LINE
TAN⁻¹ nK / n-L (SEE NOTE 1)
LEVEL LANDING
GROUND LINE
a
b
d
TAIL DOWN LANDING
BASIC LANDING CONDITIONS
NOSE WHEEL TYPE
TAN⁻¹ K
(SEE NOTE 1)
GROUND LINE
a'
b'
d'
LEVEL LANDING WITH INCLINED REACTIONS
TAN⁻¹ K
SEE NOTE 1
SEE NOTE 3
GROUND LINE
TAN⁻¹ nK / n-L
LEVEL LANDING WITH NOSE WHEEL JUST CLEAR OF GROUND
SEE NOTE 3
GROUND LINE
Note: See s23.481(a)(2)
TAIL DOWN LANDING

A summary of the petition was published on December 18, 2006 (71FR 75803). No comments were received.

The FAA's analysis is as follows:

To obtain this exemption, the petitioner must show, as required by §§ 11.81(d) and (e) respectively, that granting the request is in the public interest and will not adversely affect safety.

While similar requests have been granted in the past, this exemption will be applied to the current rules, which changed since the similar requests were granted. The FAA has carefully reviewed the information contained in the petitioner's request for exemption. The FAA agrees that the requirements proposed by Cessna are identical to transport category requirements. Cessna will determine landing gear and associated airframe loads that are adequate and appropriate for a light jet-powered airplane that will be operated only by type rated pilots. Cessna will also determine that the associated loads are adequate for the aircraft when landing on paved runways with one-g wing lift at touchdown as transport category airplanes certified under 14 CFR part 25.

The FAA's Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest and will not adversely affect safety. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator, Cessna is granted an exemption from 14 CFR §§ 23.473, 23.477, 23.479, 23.481, 23.483, 23.493, 23.723, 23.725, 23.726, 23.727, and C23.1 Appendix C of Title 14, Code of Federal Regulations (14 CFR) to the extent necessary to allow type certification of the Cessna 525C airplane without an exact showing for compliance with these 14 CFR part 23 requirements. For the 525C, this exemption is subject to the following conditions and limitations listed below:

Conditions and Limitations

1. This exemption for these rules is restricted to aircraft operating within weight limits and runway roughness expected in service for transport category aircraft.
2. This exemption applies to the Cessna Model 525C, with the limitation that the aircraft will only be operated by type-rated pilots.
3. Compliance must be shown with the proposed exemption requirements set forth herein.

Issued in Kansas City, MO, on September 20, 2007.

s/

Kim Smith
Manager, Small Airplane Directorate
Aircraft Certification Service