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1	Recaro	3.1.1.	5	daN is not a common unit.	Replace daN by N.	No	Yes	Not accepted	Expressing load values in daN is considered a common practice.
2	Recaro	3.1.1.	5	Metric and imperial unit are mixed.	Metric should be leading. Imperial could be used additionally.	No	Yes	Accepted	The CM has been revised accordingly.
3	Recaro	3.1.2.	6	Tablet holders are not mentioned.	Include 150 N downward for tablet holders.	No	Yes	Partially accepted	The CM has been revised to focus on scenarios in which interaction between a cabin occupant and a certain design feature may occur during flight, and to include a limited number of specific examples of design features that EASA considers should withstand concentrated loads in order to ensure occupant safety. The case addressed by the commenter should be discussed in the frame of a specific certification project.
4	Recaro	3.1.1.	5	Meaning of column “area” is unclear.	Clarify application of column “area”.	No	Yes	Accepted	The CM has been revised accordingly.
5	Jet aviation	3.1.1, Table 1	5	Curtain Pulling load does not differentiate if there is a free span of curtain accessible for grasping. Jet Aviation consider the full 200lbf only when the curtain is accessible. Experience further shows that the application of 200lbf down force on a closed curtain will lead to curtain carriers being pulled out of the rail.	For load application Jet Aviation suggest to differentiate between an accessible (typically closed) curtain and its open/stowed position, when the abuse load would be considered to be acting on the rail alone. The application of 200lbf on a curtain will in typical instances lead to a disconnection of the carriers from the rail. The curtain then becomes a loose (soft) item which may be stowed. In coordination with the authorities, the abuse load on the curtain rail alone (e.g. with the curtain stowed away from reach) has been agreed to be 100lbf.	Yes	Yes	Accepted	The CM has been revised accordingly.
6	Jet aviation	3.1.2, Table 3	6	Partitions, galleys, lavatories are quoted to experience a 200lbf (89daN) abuse load. Jet Aviation understand this load to be applied as a pushing load onto the bulkheads. In those instances Jet Aviation would usually apply the 300lbf pushing load. Although 200lbf is a welcome load reduction, these types of structures are usually sized by decompression loads.	Clarification is needed as to how and where exactly this load is to be applied. Jet Aviation propose to use “shoulder height” or worst location for the subject structure.	Yes	No	Partially accepted	See the answer to comment 3. The CM now states that the loads should be applied at the realistically most critical point and direction.
7	Jet aviation	3.1.2, Table 3	6	<i>Hand grip interior components</i> is not clearly defined, especially in comparison with <i>Hand rail</i> . For example: Jet Aviation install towel racks as a firm hand hold in bath rooms, sized against 300lbs. Could this now be considered to be a hand grip on an interior component, sized against 200lbf?	Clarification is needed with regards to the definition of <i>hand grip interior components</i> and <i>hand rail</i> . Jet Aviation suggest to include a listing of definitions.	Yes	No	Accepted	The CM has been revised accordingly.

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8	Jet aviation	General	General	In most instances Jet Aviation use abuse loads as a load case in an FEM investigation of that particular structure, monument, etc. By default all abuse cases are overlaid with a 1G downward acceleration as acting gravity. While gravity is a realistic assumption, its combination with downward abuse loads may lead to overly conservative loading. A sizing downward inertia case (flight or emergency landing loads) is in any case a much higher load than 1G.	Jet Aviation would encourage a clear statement that abuse loads have been chosen in a conservative manner which is to cover 1G downward gravity, and hence an overlay is not required.	Yes	No	Not accepted	Concentrated loads are independent from gravity acting on the design feature under assessment.
9	Jet aviation	3.1.2, Table 3	6	The cargo compartment abuse loading is quoted from AIRBUS EMA-663/99 "Airbus Interior Furnishing Structural Requirements" but does not quote that it should be assumed acting over an area of 1ft ² . Furthermore, loading of the compartment partition wall is to be assumed acting in two instances with 3ft separation, making the total load twice as large as quoted, namely 88daN (= 200lbs)	For completeness and accuracy, Jet Aviation would recommend to quote the application area and detail the assumptions applicable for the cargo partition wall abuse loads.	Yes	No	Partially accepted	The CM has been revised to exclude any reference to features located in inaccessible cargo compartments.
10	Jet aviation	Table 3	6	In general some abuse loads seem high in comparison to human strength or when put into perspective, e.g. 150lbf abuse on a food tray downward. Jet Aviation experience shows that depending on the food tray design, when exerting that load, the deflection will be severe and any items placed on top of the tray will most likely slide off. If used as a firm hand hold, the hand would not be sufficiently supported due to the flexibility of a typical tray. A passenger in the aisle would anyway be more likely to hold on to a seat backrest.	Jet Aviation would appreciate a more detailed distinguishing between the applicability of the quoted abuse loads. If the food tray design, albeit providing sufficient strength, deflects severely, the rationale for applying the quoted abuse load is questioned. In an occupied seat, said download on the tray would then probably be transferred into the legs of the occupant.	Yes	No	Partially accepted	See the answer to comment 3
11	Jet aviation	Table 1	5	Although the pulling load differentiates between one and two hands being used, for pushing only one value is quoted (300lbf). In Jet Aviation's experience, distinguishing between one or two hands being used also applies to pushing (150lbf). This approach has been accepted by the authorities on a number of occasions.	Jet Aviation recommend to distinguish between one and two hands pushing.	Yes	No	Partially accepted	See the answer to comment 3
12	Dassault Aviation	3	5	The Abuse Loads currently substantiated on Dassault Business Jets are different than those proposed in the CS-M-009 which seem to be standard values for airliners. "Assist and abuse" loads may be the result of persons grasping, pulling, pushing, standing or sitting on interior furnishings and their components during in-flight, aircraft servicing, or other similar events. It should be noted that Dassault make a difference between assist loads and abuse loads. Assist loads are answering a potential safety issue for a passenger, while Abuse loads are determined only to demonstrate the robustness of an equipment.	Based on those arguments, we propose to have 2 sets of Abuse and Assist load values: <ul style="list-style-type: none"> for airliners the values actually proposed in the CS-M-009 for low-occupancy aeroplanes, the values presented above that could be modified depending on element location and functionality. 		Yes	Partially accepted	EASA has not introduced in the CM any consideration specific to "low-occupancy aeroplanes", as defined in paragraph S25.1(a)(2) of CS-25 Appendix S. However, the CM has been revised to clarify that combinations of load values/directions different from the ones mentioned in the CM may be considered to be acceptable by EASA if justified to be appropriate for the specific configurations to be certified. See also the answer to comment 3.

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				<p>The following Dassault abuse loads have then been estimated assuming the weight of a passenger of 77 kg (see JAR 25.562 (b)):</p> <ul style="list-style-type: none"> • Pushing/Pulling Load: A load of 760 N (considering a passenger falling or bearing on the installation - acceleration considered 1g) from floor level up to 1600 mm above the floor level shall be considered. The load reducing linearly to 450 N at top of the cabin headliner. <p>The load is to be applied on an area of 100 mm * 100 mm.</p> <ul style="list-style-type: none"> • Upward loads: A load of 380 N (considering that the passenger stands on the floor and half the passenger weight is acting on the installation - acceleration considered 1g) shall be considered from floor level up to 1600 mm above floor level. The load reducing linearly to 200 N at top of the cabin headliner. The load is to be applied on an area of 100 mm * 100 mm. • Downward loads: A load of 1900 N (considering the passenger hanging or seating on the installation with the maximum downward fatigue load factor 2.5g) shall be considered from floor level up to 1600 mm above floor level. The load reducing linearly to 600 N at top of the cabin headliner. The seating load is to be applied on an area of 300 mm * 300 mm. For a stepping area, the load is to be applied on an area of 100 mm * 200 mm. • Specific considerations: <ul style="list-style-type: none"> ○ Pullout tables and drawers should be substantiated in their fully extended position, and the load applied at the free end and at mid width of the installation (as an example : handle of a drawer). A load of 380 N download is to be applied (considering half a passenger weight leaning on the installation - acceleration considered 1g). ○ Divider curtain loads :Free span curtain track (accessible to grasping) are designed for : <ul style="list-style-type: none"> - 760 N download (considering a passenger hanging to the curtain in its vertical position - acceleration considered 1g), - 540N forward and aft (considering a passenger hanging to the curtain which 					

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				<p>is oriented at 45° - acceleration considered 1g).</p> <ul style="list-style-type: none"> ○ Hand rails loads : Hand rails considered as a walking help are designed for : <ul style="list-style-type: none"> - Where two hands can grab the rail: 760 N download (considering a passenger hanging on the hand rail - acceleration considered 1g), - Where one hand can grab the rail: 380 N download (considering half the weight of a passenger on the floorboard and the other half pulling on the hand rail - acceleration considered 1g). ○ Plug in monitor should be substantiated under : Taking into account the localization of the plug-in monitor (on side ledges close to a seat), it is assumed that the passenger weight cannot be totally applied on the monitor: <ul style="list-style-type: none"> - A load of 380 N download is to be applied on the horizontal arm at the most objective and probable location (considering half a passenger weight leaning on the installation - acceleration considered 1g). - A load of 380 N horizontally is to be applied at the top of the vertical arm (considering a passenger pulling or pushing with one hand on the installation - acceleration considered 1g). <p>Hereafter are presented the Dassault Assist loads which have also been estimated based on a passenger weight of 77kg:</p> <ul style="list-style-type: none"> • Hand rails loads are considered as a walking help and are designed for 760N downward where two hands can grab the rail (considering a passenger falling - acceleration considered 1g) and 380N downward where one hand can grab the rail (considering that the passenger stands on the floor and half the passenger weight is acting on the installation - acceleration considered 1g) • For assist handles, a 760N load is to be applied perpendicularly to the line passing through the attachment points (considering a passenger falling or bearing on the installation - acceleration considered 1g). To account for the 					

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				<p>uneven load distribution, 70% of the assist load will be applied to one of the attachments.</p> <p>Those Abuse and Assist Loads are actually used to design Dassault Falcon Business jets interiors and no monument or equipment failure has been observed due to Abuse Loads on all the fleet.</p> <p>Business Jets or low-occupancy aeroplanes (as defined in NPA 2015-19 §2.4.1) are less subjected to Abuse and Assist loads than airliners because:</p> <ul style="list-style-type: none"> On Business Jets more than 80% of the TTOL seats provide a direct access to the emergency escape aisle whereas on an airliner the window seat passengers need to cross over 2 seats at least. The low number of passengers per emergency exit on Business Jets compare to airliners (one third as per NPA 2015-19), limits the probability of Abuse load occurrence. <p>On Business Jets items such as Curtains, plug in monitor, pullout tables are stowed in closed compartments during TTOL and then not accessible to passengers whereas on Airlines, they are visible and accessible for grasping from the emergency escape aisle and then passenger could be subject to injuries.</p>					
13	Boeing Commercial Airplanes	1.1 para 2	3	<p>THE PROPOSED TEXT STATES:</p> <p>The implementation of the existing certification specifications has not produced a consistent application of abuse loads for cabin interior certification.</p>	<p>REQUESTED CHANGE:</p> <p>Withdraw this certification memo and re-assess the approach to developing guidance for cabin interior abuse loads utilizing industry to develop new specific performance criteria if needed.</p> <p>JUSTIFICATION:</p> <p>Assist loads are not specified in the regulations. Advisory information allows that assist loads are available as a means of showing compliance.</p>			Partially accepted	EASA considers that the publication of the present CM will serve to clarify how loading conditions for occupant safety in cabin interiors need to be considered in the context of large aeroplane certification projects. As a consequence, the CM will not be withdrawn. EASA is open to consider any standards that may be generated by the Industry in the future to address loading conditions for occupant safety in cabin interiors.
14	Boeing Commercial Airplanes	1.1 para 3	3	<p>THE PROPOSED TEXT STATES:</p> <p>Where a monument (fixed furniture) or equipment has the capability to have loads applied, either through deliberate use of hand holds, steps or operating interfaces, or accidentally applied loads because of location or configuration, abuse loads should be defined that will ensure a level of structural integrity such that the monument will continue to function safely after the application of the abusive loading.</p>	<p>REQUESTED CHANGE:</p> <p>Withdraw this certification memo and re-assess the approach to developing guidance for cabin interior abuse loads utilizing industry to develop new performance criteria if needed.</p> <p>JUSTIFICATION:</p> <p>The EASA Certification Specifications (CS) for Structures, listed in the References section of the proposed CM, are all airplane level load conditions (flight/gust/maneuver inertia loads, emergency landing loads, decompression loads) which have no relation to occupant applied assist loading, as found in the regulation itself, the NPA material advising rule</p>			Partially accepted	See the answers to comments 3 and 13.

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					change, or AMC material. Similarly for the non-Structures specific CS's, assist loading isn't specified, but through advisory information allows that assist loads are available as a means of showing compliance. Based on the regulations in the reference section, fixed furniture or other interior structure already possess substantiation data to Structures CS load conditions, which are substantial and service history has shown to design resilient structure. However, specific furniture features are known to be targets of excess loading, such as push/pull loads of seat arm rests. The proposed memo suggests assist load conditions to be applied quite broadly to aircraft interior structure, when it would be more effective to consider specific interior features for specific performance to assist loading. This has already been done in the case of In-seat deployable video with ARP 5475 as a performance standard, and seat armrests and other seat features with ARP 5526. Further application of assist loading should be for specific interior features based on potential application of loads (driven by historical data) and the subsequent hazard or consequence. It is recommended that industry participants be involved to produce new specific performance criteria if needed.				
15	Boeing Commercial Airplanes	3.1.1 General loads	5	<p>THE PROPOSED TEXT STATES: (entire section 3.1.1, with load curves and tables)</p> <p>REQUESTED CHANGE: Withdraw this certification memo and re-assess the approach to developing guidance for cabin interior abuse loads utilizing industry to develop new performance criteria if needed.</p>	<p>JUSTIFICATION: Boeing would like to advise our view of different occupant applied loads: 1) reasonable loading due to normal use, 2) incidental loading from falling or grasping, and 3) abuse load, which is intentional misuse. This last category is a subset load category to drive more robust interior structure designs as a customer satisfaction/quality measure. Boeing uses these types of loads as a quality standard. An airframe manufacturers loads for quality should not be used as certification requirements for cabin safety.</p>			Partially accepted	The CM title and content have been changed to avoid possible confusion introduced by the use of the expression "abuse loads". See also answers to comments 3, 12 and 13.
16	Boeing Commercial Airplanes	3.1.2 Specific items	6	<p>THE PROPOSED TEXT STATES: (entire Section 3.1.2)</p>	<p>REQUESTED CHANGE: Withdraw this certification memo and re-assess the approach to developing guidance for cabin interior abuse loads utilizing industry to develop new performance criteria if needed.</p> <p>JUSTIFICATION: Abuse loads particularly, and assist loads more generally, are not specified by regulation. Some industry standards such as ARP 5475 and ARP 5526 specify performance criteria using assist loading as an available means of showing compliance. These load values are listed in industry standards after due consideration for the equipment item being considered. These are listed in the first 8 lines of the table in Section 3.1.2. Additional equipment items may need to be considered, but should be considered</p>			Partially accepted	The examples of values provided in the CM are considered to be acceptable but not mandatory by EASA. The CM clarifies that OEM specifications already accepted by EASA remain acceptable. See also the answers to comments 3, 9 and 13.

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					specific 1) to an equipment item's consequence of failure to be relevant to occupant safety, 2) then select a magnitude that can be reasonably applied. As an example, sidewalls can only have an assist load applied in the outboard direction, and the consequence of failure would be cracking of the panel before resting upon the fuselage, resulting in no safety hazard. No assist load requirement needed. As for cargo compartment walls, these are not available for assist loading to the traveling public, and not at all when the aircraft is in flight. Hence, no safety hazard to protect against. These types of considerations must be discussed in an industry forum to produce new specific performance criteria if needed.				
17	TCCA	1.1	Purpose and Scope	The scope addresses cabin interiors. Clarification is requested to ensure that cabin interiors is included all areas of the aeroplane that could be occupied during the entire flight, or for only part of the flight. These other areas could be crew rest areas, large stowage compartments, cargo compartments accessible during flight (such as Class B cargo compartments), etc. This may also include addressing special features contained in Special Conditions for Crew Rest Areas.				Accepted	The CM has been revised to focus on the interaction between occupants and cabin interior features. This would include cargo compartments that are accessible in flight. See also the answer to comment 9.
18	TCCA	3.1.2	Specific Items	This Section should include lavatory doors as their opening and closing procedure is easily confused by passengers who then tend to push and pull on the door with more force that would be required if the door was opened or closed correctly.				Partially accepted	See the answer to comment 3.
19	TCCA	3.1.2	Specific Items	Features, such as extra handles, hand rails, etc., added to the aeroplane specifically to facilitate the transport of disabled passengers and to accommodate their needs during flight can be subjected to high loads. This may be particularly if the passenger's disability makes them unsteady while moving about the aeroplane or using the facilities.				Partially accepted	See the answer to comment 3.
20	TCCA	3.1.2	Specific Items	Are the cargo compartment ceiling, lining and sloping, and partition wall based on the assumption that the aeroplane cargo compartment configuration is a bulk loaded compartment or a containerized (ULD) compartment?				Partially accepted	See the answer to comment 9.
21	TCCA	3.12	Specific Items	Particularly in narrow body aeroplanes, stowage compartments - overhead bins, etc. - can be subjected to passenger loads due to inadvertent contact by passengers during flight with sudden turbulence or while boarding and deplaning. Open compartment doors may also be in a location where passengers may contact them resulting in door breakage or passenger injuries.				Noted	The CM has been revised to refer to the assessment of possible safety critical scenarios. Features which are potentially subject to critical interactions with occupants should be evaluated. See the answer to comment 3.

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22	TCCA	N/A	May be related to the galley design criteria more than cabin interior abuse loads	Galley cart weight limits are sometimes exceeded leading to faster deterioration of the galley floor panels and main aisle floor panels. Galley stowage compartment and restraint latches are typically designed for some overweight allowance and for flight and turbulence loads.				Noted	We concur with the comment made by TCCA but we understand that no change to the CM was requested. The CM does not address latching and weight content limitations of stowage compartments.
23	TCCA	N/A	May be related to the stowage compartment design more than cabin interior abuse loads	Stowage compartments, particularly overhead bins, which are designed with specific weight limits whose limits can be exceeded by passengers stowing their carry-on baggage. Stowage compartment design should include safety factors for unintended overloading of bins, however, there may not be consistent factors applied. NTSB document : https://www.nts.gov/safety/safety-recs/recletters/A-12-001-006.pdf				Noted	See the answer to comment 22.
24	TCCA	N/A	General	Section 3.1 indicates that the objective is to provide guidance on acceptable abuse load values. A definition of abuse load seems to be a fundamental part of the CM that is missing.				Noted	The CM has been revised to include a more detailed explanation of the loads that are targeted.
25	TCCA	N/A	General	The understanding of the definition of abuse load is: With regards to a component (specific item), an abuse load is any load that does not originate from the component (specific item) intended use. For example: In the case of a seat, seating on the armrest is not the intended use of the arm rest. For a curtain, grabbing the curtain to break a fall is not the intended use of the curtain. In the case of a decorative shroud, seating on the shroud is not the intended use of the shroud.				Noted	See the answer to comment 24. The CM addresses possible scenarios, regardless of the intended use.
26	TCCA	N/A	General	Therefore, for an abuse load to exist, the originally intended use and its associated load need to exist first.				Noted	See the answer to comment 24.

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27	TCCA	Table 1	General abuse loads	<p>Based on the rationale above, Table 1 cannot be called “General abuse loads” because there is no component (specific item) and originally intended use defined, except for the last row (curtain).</p> <p>This table seems more like a human strength force table.</p> <p>Such a table may be useful to allow derivation of abuse loads for components (specific items) not included in Table 3, which can’t cover all possible scenarios. Although, from that perspective, the rows Up and Down do not define a human action, like the other rows (pushing, pulling, seating, stepping).</p> <p>Finally, the last row, Curtain pulling, should be moved to Table 3, since it is a specific item.</p>				Partially accepted	See the answers to comments 3 and 24. Curtains are now quoted in table 2 (formerly table 3) in paragraph 3.1 of the CM.								
28	TCCA	Table 3	Specific items abuse loads	<p>Table 3 should be changed table to have the following 7 columns:</p> <ol style="list-style-type: none"> 1) Items Description 2) Load Direction 3) Location of Point of Application 4) Area of Application 5) Location of Area of Application 6) Load Value 7) Reference <p>When the load is punctual columns 4 and 5 are not applicable.</p> <p>When the load is distributed column 3 is not applicable.</p>				Partially accepted	Table 2 (formerly table 3) has been revised partially in line with what is proposed in TCCA’s comment.								
29	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee			<p>Thank you for providing the opportunity to comment on the subject Certification Memorandum (CM).</p> <p>Under the auspices of SAE Aircraft Seat Committee we formed an industry ad hoc committee to review and comment on the subject proposed CM.</p> <p>The industry ad hoc committee consisted of representatives from the following companies:</p> <table border="1" data-bbox="750 1570 1210 1887"> <thead> <tr> <th>Company</th> <th>Type of Business</th> </tr> </thead> <tbody> <tr> <td>Airbus Commercial Aircraft</td> <td>Aircraft Manufacturer</td> </tr> <tr> <td>Boeing Commercial Airplanes</td> <td>Aircraft Manufacturer</td> </tr> <tr> <td>HAECO Cabin Solutions</td> <td>Seat Manufacturer</td> </tr> </tbody> </table>	Company	Type of Business	Airbus Commercial Aircraft	Aircraft Manufacturer	Boeing Commercial Airplanes	Aircraft Manufacturer	HAECO Cabin Solutions	Seat Manufacturer				Partially accepted	See the answers to comments 3 and 13.
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				Rockwell Collins	Seat Manufacturer					
				RECARO Aircraft Seating, Germany	Seat Manufacturer					
				RECARO Aircraft Seating, USA	Seat Manufacturer					
				STELIA Aerospace	Seat Manufacturer					
				Zodiac Seats California	Seat Manufacturer					
				Zodiac Seats France	Seat Manufacturer					
				Zodiac Seats UK	Seat Manufacturer					
				Zodiac Seats US	Seat Manufacturer					
				<p>The ad hoc committee has reviewed the proposed CM and has a number of concerns,</p> <p>We encourage EASA to take into consideration our concerns and comments (please see attached file) before finalizing the CM.</p> <p>These concerns can be summarized as follows:</p> <ul style="list-style-type: none"> • The intent of abuse loads has always been to ensure robust design, not showing compliance to regulations. • Abuse loads are evaluated in specific manners for specific commodities when a consequence of failure rises to an issue of safety, but not applied in general terms to every cabin interior component. • Abuse loads do not address functional integrity or safety of parts beyond those already required by regulations. • Application of abuse load requirements broadly across cabin interior components will conflict with established design criteria and performance of some commodities. <p>The ad hoc committee believes the CM as written will not achieve its intended goal of providing specific guidance on consistent application of abuse loads, and instead it would lead to contradictory interpretation that would negatively impact existing compliant designs and create confusion in development of new designs.</p> <p>In order to guarantee accuracy, avoid confusion, and ensure consistent application of abuse loads, the ad</p>						

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				<p>hoc committee strongly encourages EASA to work with the industry to develop a comprehensive set of non-regulatory guidelines. Alternatively, if new regulation is the intent of EASA, then it is recommended that the matter be subjected to EASA's established rulemaking procedures by conducting preliminary impact assessment (PIA) and regulatory impact assessment (RIA) first.</p> <p>Please see our comprehensive comments below in EASA prescribed format (3 pages). Ref to comment 30 to 34 of this CRD.</p> <p>Please do not hesitate to contact the undersigned for any further information you might require.</p>					

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30	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee	Entirety of CM		<p>The nature of this document is unclear, as the preface states that a CM is “not intended to introduce new certification requirements”, yet it appears that this CM is proposing to make “abuse loads” a regulatory requirement.</p> <p>Currently the abuse loads test data are not used to find compliance with the regulations noted in section 1.2 of the CM.</p> <p>In addition to the established regulatory load requirements currently in effect, the airframe manufacturers expect that the following occupant applied loads to be considered when developing a component as a quality standard:</p> <ol style="list-style-type: none"> 1) Reasonable loading due to normal use, 2) Incidental loading from falling or grasping, and 3) Abuse load, which is intentional misuse. <p>This last category is a subset load category to drive more robust interior structure designs as a customer satisfaction/quality measure.</p> <p>Although abuse loads in particular, and assist loads in general, are not specified by regulations, some industry standards such as ARP 5475 and ARP 5526 specify performance criteria using assist loading as an available means of showing compliance.</p> <p>Under certain conditions data developed during abuse load analysis or test are used to show compliance to some certification requirements. However, abuse loads, in and of themselves, were not developed to show compliance to certification requirements. As such, there has been no investigation to determine validity or correlation between a robust design and any safety aspect.</p> <p>If abuse loads substantiation is to become a regulatory requirement, then the expectation is that established rulemaking procedures are followed to conduct preliminary impact assessment (PIA) and regulatory impact assessment (RIA) first.</p>	<p>Establish that the guidance is published only to support robust design in cabin interiors and does not add to the regulatory requirements detailed in the reference section.</p> <p>Refer to the ARP 5475 statement to clarify that the effect of an abuse load failure on the equipment’s ability to meet other regulatory requirement is not mandated (e.g. the possibility of a double failure of an in arm video system (IVS)).</p> <p>The load values listed in industry standards were developed for specific equipment item being evaluated.</p> <p>Any regulatory requirement being developed should take into consideration the specifics of the equipment and:</p> <ol style="list-style-type: none"> 1) An equipment item’s consequence of failure in relation to occupant safety, and 2) The magnitude that can be reasonably applied. <p>As an example, sidewalls can only have an assist load applied in the outboard direction, and the consequence of failure would be cracking of the panel before resting upon the fuselage, resulting in no safety hazard. No assist load requirement needed. As for cargo compartment walls, these are not available for assist loading to the traveling public, and not at all when the aircraft is inflight. Hence, no safety hazard to protect against.</p> <p>Ad hoc industry team recommends that these considerations be discussed in an industry forum tasked to produce new specific performance criteria, as needed.</p>	No	Yes	Partially accepted	The CM has been revised to clarify the link to CS-25 requirements. See the answers to comments 3 and 13.

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31	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee	1.1	3	<p>Apart from normal use and abuse loads discussed in comment 1, an appliance may be subjected to incidental or accidental loading as a result of stumbling/fall, or deliberate use such as hand-hold. This category of loads are considered “assist loads”.</p> <p>Assist loads are not specified in the regulations. Advisory information allows that assist loads are available as a means of showing compliance.</p> <p>The EASA Certification Specifications (CS) for Structures, listed in the References section of the proposed CM, are all airplane level load conditions (flight/gust/manoeuvre inertia loads, emergency landing loads, decompression loads), which have no relation to occupant applied assist loading, as found in the regulation itself, the NPA material advising rule change, or AMC material.</p> <p>Similarly for the non-Structures specific CS, assist loading is not specified, but through advisory information allows that assist loads are available as a means of showing compliance. Based on the regulations in the reference section, fixed furniture or other interior structure already possess substantiation data to Structures CS load conditions, which are substantial and service history has shown to design resilient structure.</p> <p>However, specific furniture features are known to be targets of excess loading, such as push/pull loads of seat arm rests. The proposed memo suggests assist load conditions to be applied quite broadly to aircraft interior structure, when it would be more effective to consider specific interior features for specific performance to assist loading. This has already been done in the case of In-seat deployable video with ARP 5475 as a performance standard, and seat armrests and other seat features with ARP 5526. Further application of assist loading should be for specific interior features based on potential application of loads (driven by historical data) and the subsequent hazard or consequence.</p>	See comment 1.	No	Yes	Partially accepted	See the answers to comments 3 and 13.

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32	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee	1.1	3	<p>Sentence “The scope of this document is limited to the loads to be applied, it does not address strength or deformation substantiation” is not clear.</p> <p>The scope excludes deformation and strength, however, further sections discuss functionality and obstructions:</p> <p>Example: “[...] -Will continue to function safely after the application of abusive loading; [...]”</p> <p>Equipment damaged by application of abuse load should not be required to function, provided the damaged part does not create an unsafe condition, which could be injurious or sharp edges, or impediment to emergency egress.</p>	<p>Clarify that it may be acceptable for an object to fail to function due to application of abuse load provided it does not pose a hazard to egress, or cause injury to occupants.</p> <p>Define the scope of the document as limited to the loads to be applied, and associated pass/fail criteria.</p> <p>Provide pass/fail criteria where loss of function is not considered a failed condition, as long as the resulting condition does not represent a hazard in itself to egress, evacuation or occupant’s injury.</p> <p>Establish pass/fail criteria with industry and other authorities input to promote harmonization.</p>	No	Yes	Accepted	The CM has been revised to clarify that any failure under the loading conditions specified in the CM is acceptable as long as it does not adversely affect the safety of the occupants.
33	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee	Table 1 & 3	5 & 6	<p>Application of loads specified in this document is too general and conflicts with specific commodities’ design performance and criteria.</p> <p>For example, the loads specified are excessive for seat design consideration. Current minimum performance standards (MPS) per TSO-C127b requires a maximum load tolerance of 300lbs. Seating or stepping load is defined at 222 daN (~ 500 lbf) whereas, the stepping load defined in ARP5526 Rev C (called under E/TSO-C127b) is 300 lbf (“Step load on baggage bar” and “Flight attendant step load”) . Or high abuse load can sometime hinder safety-related feature, for example a suite door may be required to fail early to insure egress and safety, a high abuse load requirement may pose a conflict with SC or issue paper requirements.</p> <p>In addition, loads published in this document conflict with several OEMs contractual requirements, and location and direction for application of the loads are not specified.</p> <p>Tables 1 and 3 need to address the same attributes (distance from floor, load, load-level, area).</p> <p>The scope of the document appears to conflict with the tables content; CM title refers to cabin interior abuse loads, however, cargo compartment ceiling, lining/sloping and partition wall have been included, which are not part of cabin interiors.</p>	<p>Load limits, direction of application, area of application (load distribution) and method of application vary depending on the equipment/appliance being evaluated. Ad hoc industry team recommends that these be developed with the help from industry, utilizing, and expanding on, published standards and recommended practices.</p>	No	Yes	Partially accepted	See the answers to comments 3 and 13.
34	Raki Islam, Zodiac Seats On behalf of Industry Ad hoc Committee	Table 2	6	<p>The conversion is not accurate between the daN and the lbf. Indeed, testing at 66 daN is converted to 148.37 lbf and not 150 lbf. Which one prevails on the other? It has to be harmonized with the SAE policy regarding International Units.</p>	<p>Revise loads to accurately represent the conversion units.</p>	Yes	No	Noted	In case of doubt, the International Units prevail. The conversion to Imperial Units is indicative and conservative. See also the answer to comment 2.

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35	Rockwell Collins	3.1.1 Table 1	3	Unclear if the pushing load should be applied to a closed- or open door.	<p>Please identify in table 1, if the pushing load must be applied to an open door, closed door or both.</p> <p>Please keep in mind that in case the load must be applied to the equipment with an opened door, the reaction forces on the monument can be excessive.</p> <p>Appendix A, shows a typical ARINC 810 size 4 or 2 equipment in a monument (galley) installation. The geometry drawing shows that an push load, applied to the edge of the door, causes a reaction force on the dividing galley wall. This reaction force is about 14 times higher than the applied push load. It can be expected that the dividing galley wall cannot maintain this high reaction force.</p>  <p>Appendix A.pdf</p> <p>Based on the above argumentation, could you please specify that in case the push load is to be applied to an open door the following criteria applies: “.....continue to function safely after the application of abusive loading or fails in a safe manner”</p>	Yes		Partially accepted	See the answer to comment 3.
36	Rockwell Collins	3.1.1 Table 1 Figure 1	3	Load naming in table 1 does not match with load naming in figure 1.	Please use same load naming in table 1 and figure 1.	Yes		Accepted	The CM has been revised accordingly.
37	MITAC		1	There are cargo compartment items listed in Table 3 (Page 6). EASA has already indicated to MITAC that “abuse loads tests on cargo liners are appropriate to address impact with cargo during the loading phase and shifting in-flight”. However, there is no applicable regulatory requirement listed in the CM.	CS 25.787(b) should be listed in Regulatory Requirement(s)		Yes	Partially accepted	See the answers to comments 9 and 17.
38	MITAC	Section 1.2 Table	3	There are cargo compartment items listed in Table 3 (Page 6). EASA has already indicated to MITAC that “abuse loads tests on cargo liners are appropriate to address impact with cargo during the loading phase and shifting in-flight”. However, there is no applicable regulatory requirement listed in the CM.	CS 25.787(b) should be listed in the Table in Section 1.2.		Yes	Partially accepted	See the answers to comments 9 and 17.
39	MITAC	Section 3.1.2 Table 3	6	There are cargo compartment items listed in Table 3 (Page 6). EASA has already indicated to MITAC that “abuse loads tests on cargo liners are appropriate to address impact with cargo during the loading phase and shifting in-flight”. However, there is no applicable regulatory requirement listed in the CM.	CS 25.787(b) shall be referenced for the last three items in Table 3		Yes	Partially accepted	See the answers to comments 9 and 17.

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40	MITAC	Section 1.2	3	There is a Table in Section 1.2 (Page 3). This Table does not have a number. All other tables in the CM have a number.	Add a number to the Table in Page 3	Yes	Yes	Accepted	The CM has been revised accordingly.
41	MITAC	Section 3.1.2 Table 3	6	The CM contains abuse loads values in table 3 – without any reference from which this values have been obtained (the SAE and specific references for seats are excluded from this comment)	List all applicable regulations referencing the Abuse loads in table 3 – with a rationale of how these values have been established and issued		Yes	Accepted	The CM has been revised accordingly.
42	MITAC	Section 3.1.1 Figure 1	5	The diagram inserted in the section 3 has no foundation There are no sources in this diagram	It is required for EASA to provide rationale for the values and the diagram in Fig 1		Yes	Accepted	The CM background has been revised accordingly.
43	MITAC			Discrepancy on food tray table load value between the CM, ARP5526 referenced and AS8049A which is commonly used.	It is required that EASA verifies the values listed in the CM – as it has introduced differences in between the original values and the transformed values in between lbs and kg.		Yes	Accepted	See the answer to comments 2 and 3. Please note that the reference to the food tray item has been removed.
44	MITAC	Section 3	5	The interpretation of the statement “these loads serve as general reference” – is confusing as this can mean that each OEM will chose its own values – aside from those specified by public standards	Remove the sentence: “these loads serve as general reference” Replace with: Abuse loads values specified in the SAE standards are to be used for those specific items they are destined for Or The designers should determine appropriate values for the abuse loads for specific cases		Yes	Partially accepted	See the answers to comments 3, 13 and 16.
45	MITAC	Table 1 vs Table 3	5,6	Discrepancies between the values listed in those tables for the same items	EASA has to verify the numbers before publication		Yes	Accepted	The CM has been revised accordingly.
46	MITAC	ALL		Abuse loads are applied to the design of cabin interiors as indicated on the title of the CM. However, Table 3 mentions items of cargo which are not necessarily interior items and in some cases cannot be accessed by passengers during flight, boarding or deplaning (CS 25.857).	Change the title to include Cargo Compartment items Or Remove Cargo items from the CM		Yes	Accepted	See the answers to comments 9 and 17.
47	MITAC		4	This paragraph does not offer any specific information – therefore cannot be used as guidance of any sort “It appears that a safe cabin inherently results from good design practice applied over many years. Different manufacturers have developed specifications for abuse load values. Typically different abuse loads are established based on the load likely to be applied. Some of the load values in manufacturer specifications reference to the same source documents (SAE and recognised textbooks)”	Delete the whole paragraph If the paragraph is not deleted specific details are required to rationalise the statements		Yes	Partially accepted	The paragraph has been revised to improve its clarity.

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48	MITAC		3	Abuse loads generally are considered ultimate loads (when ultimate loads are less than the prescribed or recognized abuse loads) Ultimate loads as per the regulation applicable – to ultimate loads are not subject to any factorization	“If compliance is shown through test, additional factors on the load applied at test, to take variability into account, may need consideration.” To be deleted		Yes	Partially accepted	As stated in the CM, based on experience, the relatively low frequency of occurrence of abuse and assist loads makes it more appropriate to consider them as ultimate static loads. The CM text has been modified to clarify that if compliance is shown through testing, additional factors may be needed on the value of the load, to take material and process variability into account.
49	MITAC		4	“CS 25.785 (j) requires firm handhold to be available when using the aisles.” The rule states: “25.785(j) :If the seat backs do not provide a firm handhold, there must be a handgrip or rail along each aisle to enable persons to steady themselves while using the aisles in moderately rough air.”	Regulation to be quoted and not interpretation of the rule		Yes	Accepted	The CM has been revised accordingly.
50	MITAC		All	The CM quotes sometimes regulations, other times vague sentences or partial interpretation of the rule.	The CM shall quote applicable regulations and how abuse loads are used to show compliance to those regulations	Yes		Partially accepted	See the answer to comments 3 and 30.
51	MITAC	3.1.2 Table 3		PSU in table 3 - is an assembly which contains an array of items – the reference is vague and does not discriminate	Specify the elements in the PSU needed to be subjected to abuse loads		Yes	Partially accepted	The reference to the PSU has been removed. See the answer to comment 3.
52	MITAC	2. Background		“Three possible situations can lead to the application of abuse loads: - Improper use of the cabin item.” This paragraph does not define improper use.	“Improper use” – should be limited to un-intentional improper use of any cabin item by the passengers only – it should be stated and not include the trained personnel (pilots, cabin crew, etc.		Yes	Not Accepted	The CM has been revised to focus on scenarios in which interaction between cabin occupants, including flight crew members, and certain design features, may occur during flight.
53	JCAB			In general JCAB appreciates EASA approach to issue this memorandum to clarify abuse load requirement		Yes		Noted	EASA acknowledges this comment. The publication of the present CM is intended to clarify how loading conditions for occupant safety in cabin interiors need to be considered in the context of large aeroplane certification projects.
54	JCAB			JCAB believes the requirement is for baseline design of cabin interior compliance. It is required to assure all parts are intact to show compliance to requirements. Many regulations refer to 25.561 load for conditions of compliance. But in relatively small compartments, abuse load requirement would be higher than 25.561 load. And abuse load is subject to be applied in normal flights not crash landings.	We consider to list more requirements such as 25.785, 25.787, 25.789, 25.803, 25.807, 25.809, 25.810, 25.811, 25.813, 25.815.	Yes		Partially accepted	See the answers to comments 3, 9, 17 and 30.

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55	JCAB	3.1.2		In par 3.1.2, last rows are mentioning about cargo compartment. We agree that abuse loads needs to be applied to cargo compartments. But throughout the document, there is no discussion about cargo and it is unclear what would be the rationale relating to it. Normally abuse load requirement applies to an area where exposed to passengers in flight. In the case of most cargo, it is not accessible neither to passengers nor in flight. But in place even if it is not a passenger, it is easily supposed to have a big abuse banging baggage o liner and floor by loading personnel.	It is requested to add description how abuse load to cargo parts shall be interpreted.	Yes		Partially accepted	See the answers to comments 9 and 17.
56	Leonardo Aircraft	Table 1	5	At page 5 of the CM §3.1.1 – the table (table 1) reports that for Curtain pulling that I have consider 89 daN from 0 cm up to 150 cm and 0 daN from 150 cm up to 215cm, It is right? Because in the graphic in the same page (fig 1) for the conditions 6 I have to consider 44 daN from 0 to 200 cm, could you explain the differences? What is the differences between Free Span Curtain Track download condition and curtain down load ? If I have to design a beam that support a curtain, the beam is at 200 cm from the floor, what abuse load do I have apply ? in the graphic in fig. 1 it is not clear if I have apply 44 daN (condition 6) in download direction or 89 daN(condition 5)		Yes		Accepted	See the answer to comment 5.