

## Saving Lives – Does Your Vehicle Comply with this Standard?

by Ted Larson, VP of Operations, Vantage Mobility International.

When you get into your vehicle on a daily basis, you assume that vehicle will get you from point A to point B without too many problems. Naturally, life isn't always that predictable and things happen. It's when those unpredictable events become catastrophic that most of us take notice and our lives are changed forever. Everyone expects that their vehicles are safe to drive and will protect them and their loved ones, if something catastrophic does occur. This is even more critical for those with disabilities and those who care for them.

Recently, a very important date came and went on September 1, 2009, that had little fanfare or publicity. However, this date is very important to vehicle safety as it relates to the mobility industry and wheelchair accessible conversions. This date was established by the National Highway Traffic Safety Administration (NHTSA), to ensure that all final stage manufacturers or alterers, comply with the upgraded Federal Motor Vehicle Safety Standard (FMVSS) 301R – Fuel System Integrity. It's a very high profile standard that the mobility industry has known about for several years and like the Original Equipment Manufacturers (OEM), is intended to save anywhere between 8 and 21 lives annually. For anyone privileged enough to stand along side a test track while a deformable barrier impacts a vehicle at 50mph, you can appreciate the tremendous

engineering effort required to ensure that the fuel system withstands and survives this aggressive impact without leaking stoddard (or at least a minimal amount in accordance with FMVSS 301R).

Standard No. 301, which was issued in the 1970's, limits the amount of fuel spillage from fuel systems of vehicles during and after being subjected to a front, rear or side impact test. In 1995 NHTSA published an Advanced Notice of Proposed Rulemaking (ANPRM) announcing the agency's plans to consider upgrading the standard. NHTSA received comments from component and vehicle manufacturers, industry associations, consumer advocacy organizations and other organizations. After reviewing comments, real world crash data and data from seventeen crash tests with the new crash test procedure, NHTSA published a Notice of Proposed Rulemaking (NPRM) in November 2000. The agency proposed replacing the existing standard with one that would specify impacting the rear of the test vehicle at 80 km/h (50 mph) with a 1,368 kg (3,015 pound) moving deformable barrier (MDB) at a 70 percent overlap with the test vehicle. The agency noted that the proposed test procedure would simulate a type of rear vehicle-to-vehicle collision that can result in post-crash fire in an otherwise survivable crash.

In their final ruling, NHTSA provided a phase in of the upgraded standard. At least 40 percent of the vehicles manufactured on or after September 1, 2006, but before September 1, 2007, must comply with the new rear impact requirements. At least 70 percent of the vehicles manufactured on or after

September 1, 2007, but before September 1, 2008, will have to comply, and starting September 1, 2008, all vehicles manufactured will have to comply with the upgraded requirements. Additionally, vehicles manufactured on or after **September 1, 2009**, by a final stage manufacturer or alterer, must comply with the requirements of the upgraded standard. Further, there are no exceptions based on model year or body style transition.

For many reasons, VMI chose to address the upgraded standard in mid 2009, but also had many other development projects which required precious production and engineering resources. We were a bit optimistic in our planning and decided that we could start addressing the upgraded standard formally in early summer. We had three products to address during this timeframe, which included the Ford Full Size E-series van conversion, the Dodge/Chrysler side entry minivan conversion and the Honda Odyssey side entry minivan conversion. The project team very systematically evaluated each product using a blend of automotive engineering experience along with Design For Six Sigma (DFSS) tools to help identify failure modes during an impact. This information was ranked and weighted to ultimately provide direction on what design changes were to be implemented. Each test vehicle was prepared with the new configuration and scheduled for testing.

The wait was over and it was time to see just how well the team had prepared for this moment. Experienced automotive structural engineers will tell you that no one can be 100% certain of the outcome. Even with sophisticated Computer Aided

Engineering (CAE) tools and many years of real world experience, the final moment of impact is still a nail biter. Fortunately, VMI was successful with its first attempt on the Ford Full Size and the Dodge/Chrysler minivan. However, it took several attempts for the Honda Odyssey minivan and required some extra attention to detail in the process. When it was clear that the Honda presented some unique challenges, VMI called in the big guns from Detroit. Roush Industries had worked on several previous projects with VMI and it was exactly the type of expertise required for this job. Roush provided structural engineering and CAE consulting to review the VMI proposed solutions. The Honda rear independent suspension is very different from Dodge/Chrysler along with the space surrounding the fuel tank. This space provides for movement during the impact. When it was all said and done, VMI ended up with a structurally sound conversion that complies with FMVSS 301R. Words cannot fully describe the results. Figure 1 is a post-crash photo of the Honda Odyssey that passed using the previous standard at 30 mph.



**Figure 1 Post-Crash at 30mph**

Figure 2 is a post-crash photo of the Honda Odyssey using the upgraded standard, which failed. Structurally, the

body was unable to provide enough protection for the fuel tank.



**Figure 2 Post-crash at 50mph failed**

Figure 3 is a post-crash photo of the Honda Odyssey that passed the upgraded standard. It is easy to see that the improvements made after the first failure resulted in a vehicle that behaves very similar to the 30 mph impact.



**Figure 3 Post-crash at 50mph passed**

This additional work took VMI well beyond the Sept 1 compliance date and we purposely stopped shipping Honda Odyssey's until we were able to pass the test. This created dozens of vehicles in our inventory that had to be reworked to meet the tested configuration. As difficult as this was, it was the right thing to do. In the final analysis, you can look at late hours spent by engineers designing new parts, the weekends building those parts and fitting them to the test vehicle. You can appreciate the two employees driving the test vehicle

from Phoenix to Wisconsin non-stop in order to meet a deadline with the test lab. You can look at the massive effort of incorporating all of the new product changes into the production line. But ultimately, it's the confidence of knowing that each and every van conversion that rolls off of the VMI production line has been built to comply with this new and aggressive safety standard. That every customer of a wheelchair accessible van is protected to the same level as any other unconverted vehicle of its type.

As a mobility dealer, I would ask the manufacturers to produce reliable proof of compliance to the upgraded standard, for every model they produce. As a consumer, I would encourage anyone who may be researching or shopping for a van conversion to ask their mobility dealer the following questions. "If the vehicle that I may be considering for a purchase was built on or after September 1 of this year, does it comply with the upgraded FMVSS 301R standard?". If the answer is yes, then ask for documentation that supports that claim. This is the best way to ensure that you are getting a product that fully complies with federal standards and provides maximum protection for you and your loved ones.