PE13-039

AGILITY

7/31/2013

NHTSA Respose 31-July-13



Agility Fuel Systems

Response to NHTSA Preliminary Evaluation PE13 Request for Additional Information

Revised 7/31/13

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Question 1 – Production Data

For each subject vehicle equipped by Agility from January 1, 2010 to date, state the following:

a) Vehicle identification number (VIN);
b) Vehicle manufacturer;
c) Vehicle make;
d) Vehicle model;
e) Vehicle model year;
f) Quantity of subject components so equipped (e.g. One, Two, Four, Six);
g) Type of subject components so equipped (Type 1, 2, 3 and/or 4 as defined by 49 CFR 571.304);
h) Location of subject components so equipped (roof mount, behind cab, side frame rail, front of body);
i) Manufacturer, part number and description of subject components so equipped (e.g. Hexagon Lincoln Tuffshell size 21.1x80, Quantum Technologies size 25x80 p/n 113508);
j) Manufacturer, part number and description of subject component valves so equipped (e.g. Youngdo YNC-2802-1 manual valves, OMB VEGA118 solenoid valves);
k) The date(s) marking the end of the manufacturer's recommended service life for the subject components so equipped; and
l) The date the fuel system integration and/or subject component installation was completed by Agility.

Provide the table in Microsoft Access 2000, or a compatible format, entitled "PRODUCTION DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Agility Response – Question 1

Please see enclosed flash drive. Reference file name: Production Data 2010-2013 Agility Fuel Systems.xlsx.

Question 2 – Consumer Complaints, Field Reports, Damage Claims

State the number of each of the following, received by Agility, or of which Agility is otherwise aware, which relate to, or may relate to, the alleged defect in the subject vehicles:

a) Consumer complaints, including those from fleet operators;
b) Field reports, including dealer field reports;
c) Reports involving a crash, injury or fatality;
d) Reports involving a fire;
e) Property damage claims;
f) Third-party arbitration proceedings where Agility is or was a party to the arbitration; and
g) Lawsuits, both pending

Agility Response – Question 2

See table below

Item	Number
Consumer complaints, including those from fleet operators;	28
Field reports, including dealer field reports;	0
Reports involving a crash, injury or fatality;	0
Reports involving a fire;	0
Property damage claims;	0
Third-party arbitration proceedings where Agility is or was a party to the arbitration; and	0
Lawsuits, both pending	0

Question 3 - Consumer Complaints, Field Reports, Damage Claims (Search Methodology)

Describe in detail the methodology and search criteria used by Agility to identify the claims identified in response to Request No. 2. Also, describe in detail the methodology used by Agility during the routine course of business to record and manage the types of items in Request No. 2 (e.g., consumer complaints, field reports, etc.), identify safety related concerns and elevate them to key decision makers at Agility who may decide whether or not a safety related defect exists that poses an unreasonable risk to motor vehicle safety.

Agility Response – Question 3

During the normal course of business, end-users and dealers contact Agility to report issues related to their fuel systems either through email communication or by phone or in-person contact and any reports of issues related to Agility's Technical Service Bulletin (TSB), titled "ENP-047 Rail Mount Periodic Maintenance and Inspection Schedule," where Agility describes four potential failure modes potentially found in the field and asks end-users and dealers to inspect for and report any such issue, are communicated through the same means of communication (email, phone or in-person contact).

Once reported to Agility via email, phone or in-person contact, Agility would discuss the reported issues with the end-user or dealer to verify the issues, and once the issue is verified by Agility, Agility would either dispatch field technicians and repair parts to perform a repair of the vehicle in the field or Agility would contract with a dealer to perform a repair under Agility's direction. Repairs of Rail Mount CNG systems related to the TSB are not performed by Agility general dealerships. Agility only contracts repairs related to the TSB to specially qualified and trained dealers.

In all cases where a verified issue was reported to Agility, a field repair has been made. Those repairs have been made at 28 end-user or dealer sites. Therefore, each of the 28 repair sites each constitutes a "consumer complaint."

Re-occurring or critical field issues, as part of the normal course of business, are documented in Agility Non-Conformance Reports (NCRs) by Product Support based upon issues identified in the field. NCRs are reviewed by Agility quality assurance. NCR reports, based upon severity or management discretion, can be escalated to a Corrective Action Report (CAR) process, and CARs are reviewed on a regular basis by Agility senior management.

Question 4 – Incident Data

Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:

a) Agility's file number or other identifier used;
b) The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
c) Vehicle owner or fleet name (and fleet contact person), address, and telephone number;
d) VIN;
e) Vehicle make, model and model year;
f) Vehicle mileage at time of incident;
g) Incident date;
h) Report or claim date;
i) Whether a crash is alleged;
j) Whether a fire is alleged;
k) Whether property damage is alleged;
l) Number of alleged injuries, if any; and
m) Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "INCIDENT DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Agility Response – Question 4

Please see enclosed flash drive. Reference file name: Incident Data Rail Mount CNG 2010-2013 Agility Fuel Systems.xlsx.

Question 5 – Consumer Complaints, Field Reports, Damage Claims Documentation

Produce electronic copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Agility used for organizing the documents.

Agility Response – Question 5

Agility does not utilize a formal "consumer complaint" format or process and because reports of issues from end-users and dealers come to Agility through various informal channels (either email, phone or in-person contact), there are no official "consumer complaints" that are captured at the time of contact. However, because all verified issues related to Agility's TSB have been repaired in the field, each site where a repair was performed is considered a "consumer complaint" for the purposes of this submittal. Therefore, there are no actual documents related to the "consumer complaints" received, but rather the Incident Data Rail Mount CNG 2010-2013.xlsx spreadsheet, which has been submitted along with this document, is the most accurate accounting of "consumer complaints." The 28 different repair sites each constitute one "consumer complaint" and the 152 repaired vehicles were all repaired at those 28 sites.

Question 6 – Warranty Data

State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by Agility to date that relate to, or may relate to, the alleged defect in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

Separately, for each such claim, state the following information:

a) Agility's claim number;
b) Vehicle owner or fleet name (and fleet contact person) and telephone number;
c) VIN;
d) Vehicle make, model and model year;
e) Vehicle mileage at time of repair;
f) Repair date;
g) Whether the repair was performed by Agility personnel. If yes, state whether the repair was performed in the field or at an Agility facility, and state the city and state or ZIP code where the repair was performed;
h) If the repair was not performed by Agility, state the repairing dealer's or facility's name, telephone number, city and state or ZIP code;
i) Labor operation number;
j) Problem code;
k) Replacement part number(s) and description(s);
l) Concern stated by customer; and
m) Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Agility Response – Question 6

Please see enclosed flash drive. Reference file name: Warranty Data 2010-2013 Agility Fuel Systems.xlsx.

Question 7 – Consumer Complaints, Field Reports, Damage Claims Documentation Search Criteria

Describe in detail the search criteria used by Agility to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State the terms of the warranty coverage offered by Agility on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that Agility offered for the subject vehicles and state the number of vehicles that are covered under each such extended warranty.

Agility Response – Question 7

All field repairs performed in response to Agility's TSB, whether performed by Agility or by a dealer authorized by Agility, are tracked by Agility Product Support (aftermarket support group within Agility) separately from all other repairs made to Agility systems in the field. All repairs made specifically in response to Agility's TSB are identified at the time of the repair as related to the TSB and therefore tracked accordingly, so there is actually no large database query that must be accomplished to gather the "consumer complaints" and the related "incident data" or "warranty data."

Regarding Agility's warranty terms, Agility's standard warranty term is 1 year from the in-service date or 18 months from the date of the shipment of the vehicle (for installed systems) or the system (for outside installations). There are no limitations based upon vehicle mileage. Agility offers an extended warranty of various terms.

Optional 36 month warranty - With 36 month warranty coverage (42 months from date of shipment), there are 225 subject vehicles covered.

Optional 60 month warranty - With 60 month warranty coverage (66 months from data of shipment), there are 135 subject vehicles covered.

Question 8 – Service Documentaiton

Produce copies of all service, warranty, and other documents that relate to, or may relate to, the following, which Agility has issued to any dealers, regional or zone offices, field offices, fleet purchasers, customers or other entities:

a) The alleged defect in the subject vehicles;

b) Depressurizing or defueling the subject components; and
c) Servicing and/or removing subject component valves.

This includes, but is not limited to, bulletins, advisories, informational documents, training documents, or other documents or communications. Also include the latest draft copy of any communication that Agility is planning to issue within the next 120 days. Also, describe the method(s) by which Agility distributes service bulletins in general and the subject bulletin in particular (e.g. publication on the Agility website, customer e-mail, customer postal mail, by special request only, etc.).

Agility Response – Question 8

Agility does not authorize its general dealer network to perform repairs of conditions described within the TSB. Agility's TSB requests that end-users and/or dealers inspect for the potential issues described within the TSB and to notify Agility if any of the issues are observed. Agility has not provided any guidance or direction for any action to be taken beyond this notification. Once notified of an issue, Agility evaluates the situation with each reporting party and determines an appropriate course of action to address the situation reported. Of the 152 vehicles that have been repaired in the field (to address issues related to the TSB), Agility field technicians have repaired 126 of those vehicles. The remaining 26 vehicles have been repaired by Agility authorized dealers only after they have been trained in-person on how to conduct the repairs associated with the potential issues described in the TBS. In these limited cases where Agility has authorized an outside dealer to repair a rail mount CNG system, Agility has provided installation instructions for the rail mount CNG system, which covers the general system installation process. This document is attached to this submittal and is also included on the flash drive in electronic format (reference file name: ENP-051 Rev A Old Side Mount Installation Instructions.pdf).

Procedures for defueling the tank system and for the repair of the Youngdo valve that may be stuck in the closed position, however, are not released to authorized dealers because each repair is unique and requires qualified resources to perform the repair. The dealers are trained to understand the potential failure mode so that they can determine the appropriate steps to take in each repair scenario. Agility provides on-the-fly technical support to dealers performing any repairs of the rail mount CNG system and the Youngdo valve to ensure that authorized dealers have no difficulties performing these repairs.

With regard to how Agility releases service documentation in general, Agility distributes service related documentation or notifications to a specific email distribution based upon the affected population of vehicles and/or if Agility system end-users or dealers requests information from Agility Product Support that is appropriate to their product lines.

Question 9 – Request for Service

State the number of each of the following, received by Agility, or of which Agility is otherwise aware, which relate to, or may relate to, the subject components in the subject vehicles:

a) Requests for service or for service information that relate to depressurizing or defueling the subject components;

b) Requests for service or for service information that relate to servicing and/or removing subject component valves;
c) The number of subject components with Level 2 damage that was deemed repairable; and
d) The number of subject components with Level 3 damage that required they be removed from service and destroyed.

Agility Response – Question 9

Item	Response
Requests for service or for service information that relate to depressurizing or defueling the subject components;	28
Requests for service or for service information that relate to servicing and/or removing subject component valves;	28
The number of subject components with Level 2 damage that was deemed repairable; and	3
The number of subject components with Level 3 damage that required they be removed from service and destroyed.	6

Discussion: Each repair of an Agility Rail Mount CNG system involves depressurizing or defueling the subject components and servicing and/or removing subject components. Therefore, all repaired vehicles meet this qualification and thus the numbers of requests for service is identical to the number of consumer complaints, which is also equal to the number of sites that Agility or authorized dealers have performed repairs related to vehicles covered by Agility's TSB.

Question 10 – Assessment, Analyses, Testing

Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, Agility. For each such action, provide the following information:

a) Action title or identifier;
b) The actual or planned start date;
c) The actual or expected end date;
d) Brief summary of the subject and objective of the action;
e) Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
f) A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

Agility Response – Question 10

See the descriptions of the 3 related items. All three documents are included on the flash drive. The reference file names are shown in the tables below.

Item 1

Item -- Root Cause Analysis (8D)	Response
Action title or identifier;	Heil-WI_document___8-D__CAR_201.pdf
The actual or planned start date;	10/26/2012
The actual or expected end date;	1/18/2013
Brief summary of the subject and objective of the action;	Determine root cause of tank rotation within bracket system
Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and	Agility Engineering
A brief summary of the findings and/or conclusions resulting from the action.	Revised installation procedures and system components were developed, validated and implemented

Discussion: During the first observance of the rotational movement of the tank within the bracket system in the field, Agility performed a Root Cause Analysis (8D) of the issue. This root cause analysis was generated in response to the initial field issue that was observed at a fleet that was operating 10 vehicles with Agility's Rail Mount CNG system in Bolivia, NC.

Item 2

Item – Youngdo Failure Mode	Response
Action title or identifier;	Youngdo Failure Mode.pdf
The actual or planned start date;	6/5/2012
The actual or expected end date;	6/5/2012
Brief summary of the subject and objective of the action;	Describe the failure mode of the Youngdo Valve
Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and	Agility Product Support (Aftermarket Support)
A brief summary of the findings and/or conclusions resulting from the action.	Youngdo seat separates from stem and becomes stuck against valve outlet port

Discussion: When the first valve was reported to be stuck in the closed position in the field, Agility Product Support conducted an evaluation of the valve in question. Upon teardown analysis, the seat

was found to be separated from the stem. This document was prepared in order to communicate the issue with the valve manufacturer, Youngdo, and to notify internal resources of the issue.

Item 3

Item -- Old Side Mount Strap Cycle Issue-ENR-015	Response
Action title or identifier;	ENR-015-Old Side Mount Strap Cycle Issue-Rev00.pdf
The actual or planned start date;	11/16/2012
The actual or expected end date;	11/16/2012
Brief summary of the subject and objective of the action;	Test stainless steel 1/2 hard straps with Belleville washer configuration as potential design solution
Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and	Agility Engineering
A brief summary of the findings and/or conclusions resulting from the action.	Tested configuration is suitable as a design enhancement

Discussion: A strap securement system, consisting of a stainless steel ½ hard materials along with spring washers (Belleville), was tested to determine if the system could accommodate the expansion and contraction of the tank.

Question 11 – Production Configuration History

Describe all modifications or changes made by, or on behalf of, Agility in the design, material composition, manufacture, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles. For each such modification or change, provide the following information:

a) The date or approximate date on which the modification or change was incorporated into vehicle production;
b) A detailed description of the modification or change;
c) The reason(s) for the modification or change;
d) The part number(s) (service and engineering) of the original component;
e) The part number(s) (service and engineering) of the modified component;
f) Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
g) When the modified component was made available as a service component; and
h) Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that Agility is aware of which may be incorporated into vehicle production within the next 120 days.

Agility Response – Question 11

Agility CNG Rail Mount Systems Production Configuration History

	Initial Release	Upate 1	Update 2	Update 3	Update 4
The date or approximate date on which the modification or change was incorporated into vehicle production;	September-10	January-12	June-12	August-12	January-13
A detailed description of the modification or change;	Initial Release	Implementation of new tank bracket isolators	Implementation of new tank strap assembly torqueing procedure	Implementation of revised bushing and discontinuance of the to use of Freightliner isolators in mixed configurations	Implementation of stainless steel straps and Belleville washers
The reason(s) for the modification or change;	N/A	To accommodate tank expansion and to prevent displacement of isolators	To address strap loosening caused by compression set of the isolator	To accommodate tank diameter variation and allow the discontinuance of mixed isolator configurations	To better accommodate tank expansion and prevent system damage from expansion
The part number(s) (service and engineering) of the original component;	N/A	Freightliner 03-24162-001, Freightliner 03-27310-000	N/A	Freightliner 03-25693-000, Freightliner 03-24162-001, Freightliner 03-27310-000	Freightliner A03-26521-000
The part number(s) (service and engineering) of the modified component;		Agility 21000148, Agility 21000149	N/A	Agility 21000160, Agility 21000148, Agility 21000149	Agility 21000161, Solon 1020125301
Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;		NO	N/A	YES	YES
When the modified component was made available as a service component; and		January-12	N/A	August-12	May-13
Whether the modified component can be interchanged with earlier production components.		NO	N/A	NO	NO

Discussion: The above table captures all changes made to Agility's Rail Mount CNG System. During the period between 9/7/12 and 4/30/13 the use of the Youngdo manual tank valve was suspended, pending resolution of the valve stuck in the closed position issue and resolution.

Question 12 – Parts Request by NHTSA

Produce one of each of the following:

a) Exemplar sample of a Youngdo manual CNG valve model no. YNC-2802-1;
b) Field return sample of a Youngdo manual CNG valve model no. YNC-2802-1 exhibiting the failure mode outlined in the subject bulletin; and
c) Exemplar sample of any subject component valves or valve repair kits that have been released, or developed, by Agility or Youngdo for use in service repairs to the subject vehicles which relate, or may relate, to the alleged defect in the subject vehicles.

Agility Response – Question 12

Agility has provided, along with this document, a used sample of a Youngdo valve with a properly functioning but old style seat assembly, a defective stem/seat assembly that has been returned from the field exhibiting the defect, and the revised replacement stem/seat assembly that is implemented in new production Youngdo valves and also used as a service replacement part to repair potentially defective valves in the field. Agility no longer has complete returned potentially defective valves that have been returned from the field because they have all been returned to Youngdo for evaluation. Additionally, Agility no longer has any new old style Youngdo valves because they have been returned to Youngdo for repair. If additional failed or new parts are required, Agility will contact Youngdo to secure necessary parts for NHTSA.

Question 13 – Youngdo Valve Sales and Repairs

State the number of each of the following that Agility has sold that may be used in the subject vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (including the cut-off date for sales, if applicable):

a) Youngdo manual CNG valve model no. YNC-2802-1; and
b) Any subject component valves or valve repair kits that have been released, or developed, by Agility or Youngdo for use in service repairs to the subject component/assembly.

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number). Also, please identify any other CNG fuel system integrators or equipment suppliers doing business in the United States, of which Agility is aware, that may be equipping NGVs with the Youngdo manual CNG valve model no. YNC-2802-1, whether installed in production or in service.

Agility Response – Question 13

	Start of Sale	End of Sale	Period Not Sold	Total Quantity Sold
Youngdo manual CNG valve model no. YNC-2802-1; and	9/29/2010	Current	9/7/12 to 4/30/13	940

Any subject component valves or valve repair kits that have been released, or developed, by Agility or Youngdo for use in service repairs to the subject component/assembly.	Oct-12	Current	N/A	236

Discussion: Of the 940 Youngdo valves that have been sold by Agility, 236 of them have been updated in the field. The repair kits are not sold individually. They are only used as a warranty service items. All valves supplied to Agility from October 2012 and later are manufactured with the revised stem/seat assembly configuration.

Contact for Youngdo Valve:

Youngdo Valve

Wonsung Byun

GM, Overseas Business Manager

#1478-1, Songjeong-Dong, Gangseo-Gu,

Busan, 618-817, Korea

Tel. +82-51-200-9000 (Dir. 9030)

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www.youngdovalve.com

Agility is not aware of any other CNG fuel system integrators or equipment suppliers using the Youngdo valve p/n YNC-2802-1.

Question 14 – Agility's Assessment of Alleged Defect

Furnish Agility's assessment of the alleged defect in the subject vehicle, including:

a) The causal or contributory factor(s);
b) The failure mechanism(s);
c) The failure mode(s);

d) Agility's rationale why it has so far chosen to not heed Youngdo's warning that "All [Youngdo YNC-2802-1] valves should be updated with a new stem and seat assembly" by proactively repairing or replacing all affected valves immediately, rather than opting to repair or replace them only as they fail in service;
e) Agility's confidence that subject vehicle customers will both be aware of and actually continue to perform the adjusted inspection and maintenance schedule described in the subject bulletin from now until the end of the subject component manufacturer's recommended service life;
f) What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component and/or valve was malfunctioning; and
g) The risk to motor vehicle safety that it poses.

Agility Response – Question 14

	Issue 1: fuel container mounting brackets become loose	Issue 2: fuel container experiences rotational movement within the mounting system	Issue 3: the fuel container mounting bracket rubber isolator is displaced	Issue 4: the fuel container manual valve is stuck in the closed position
The causal or contributory factor(s);	Improper assembly technique, improper design	Improper assembly technique, improper design	Improper assembly technique, improper design	Youngdo: improper design, production testing
The failure mechanism(s);	Tank expands and contracts and applies stress to bracket system. System yields from stress or creep in the rubber isolators and clamping force to cylinder is reduced as the tank is pressure cycled.	Tank expands and contracts and applies stress to bracket system. System yields from stress and no longer maintains clamping force to cylinder. Once tank bracket system becomes loose, tank can rotate during chassis flexation.	Tank expands and contracts and applies stress to bracket system. System yields from stress and no longer maintains clamping force to cylinder. Once clamping force is reduced, isolator may move from under strap.	Seat becomes detached from stem and becomes stuck against valve outlet seat.
The failure mode(s);	Reduced clamping force can lead to isolator displacement or movement of tank within the bracket system.	Tank movement can cause fuel lines and connection to be bent and pinched, limiting or stopping fuel flow in/out of the container.	Displaced isolators can lead to tank damage if metal bracket parts contact the tank during use.	No gas flow from valve when the handle is in the open position.
Agility's rationale why it has so far chosen to not heed Youngdo's warning that "All [Youngdo YNC-2802-1] valves should be updated with a new stem and seat assembly" by proactively repairing or replacing all affected valves immediately, rather than opting to repair or replace them only as they fail in service;	N/A	N/A	N/A	See discussion below table

Agility's confidence that subject vehicle customers will both be aware of and actually continue to perform the adjusted inspection and maintenance schedule described in the subject bulletin from now until the end of the subject component manufacturer's recommended service life;	Agility has a high level of confidence that end-users and dealers will inspect the fielded systems per the requirements in Agility's TSB and industry required periodic cylinder inspections. Industry requirements dictate that CNG cylinders are required to be inspected every 3 years or 36,000 miles per FMVSS304 and NGV2 requirements.			
What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component and/or valve was malfunctioning; and	The operator would not likely receive any warnings if a tank that has become loose in the mounting brackets.	The operator may experience poor engine performance and/or engine fault codes identified by a dashboard warning light for low fuel pressure warning if the tank has rotated and the fuel lines are compromised.	add note about obviouos isolator diplacement. The operator would not likely receive any warnings if the tank isolators have been displaced.	The operator may experience poor engine performance and/or engine fault codes identified by a dashboard warning light for low fuel pressure or may experience greatly reduced driving range if the tank valve has become stuck closed.
The risk to motor vehicle safety that it poses.	A loose tank poses low risk to motor vehicle safety.	A tank that has moved or rotated within the bracket system poses a medium risk to vehicle safety if the fuel connections have become compromised, which is possible in this failure condition.	A tank that is contacting the metal parts of the bracket system because the isolators have been displaced poses a medium risk to motor vehicle safety because the integrity of the tank may degrade over time if industry required inspections and/or Agility TSB inspections are not performed.	A valve that is stuck in the closed position poses a low risk to motor vehicle safety because the vehicle will experience a reduced range or not operate at all, as the valve gets stuck in the closed position when being opened from the off position. If suck closed during this activity, there is no gas in the fuel lines in a single tank system.

Agility's Rationale for Why Youngdo Valves are Being Fixed As Failed in the Field

NHTSA Questions: Agility's rationale why it has so far chosen to not heed Youngdo's warning that "All [Youngdo YNC-2802-1] valves should be updated with a new stem and seat assembly" by proactively repairing or replacing all affected valves immediately, rather than opting to repair or replace them only as they fail in service;

Agility's Response: The failure mode with respect to vehicle operation is either reduced vehicle range, when there are multiple cylinders in the system installed on the vehicle, or no gas flow following turning valve on from the off position in single tank systems. Both of these failure modes are low risk because they have predictable results. In the case of reduced range, the operator would have ample time to react because the fuel level display gauge on the dashboard of the vehicle would alert him or her to the depleating fuel supply. In the case where fuel will not flow from the tank when it is opened from the closed position in a single tank system, because there is very little to no fuel that would be in the fuel lines between the tank and the engine, the engine would not start or if started, it would die rapidly without sufficient time to be pulled onto a roadway. Agility has no evidence or reason to believe that the valve will fail in the closed position during normal vehicle operation, as the failure mechanism must be such that the tank valve must be closed with high differential pressure, and then opened from this condition, to cause the seat to separate and become stuck in the outlet and these conditions would not be present while the valve is open and the vehicle is in normal operation. Further,

However, Agility is not waiting for valves to fail before repairing them in many cases. Anytime Agility performs any repair to a CNG rail mount system in the field, the Youngdo valve is also retrofitted proactively with the updated/redesigned internal components. Agility is aware of less than approximately 10 valve that have suck in the closed position in the field and all of which have been repaired in the field. But, of the 940 valves that Agility has sold, 236 have been repaired in the field.

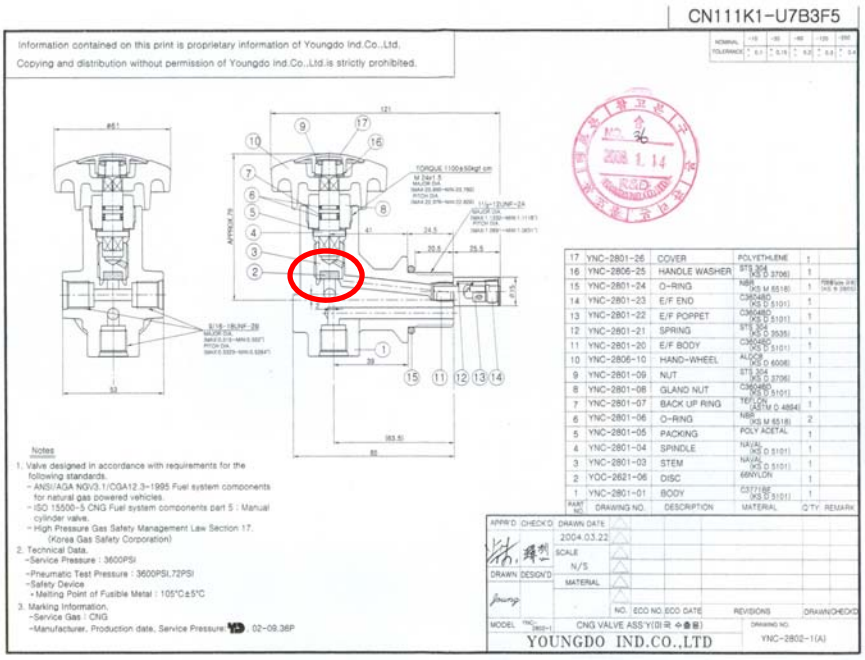
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AGILITY

7/31/2013

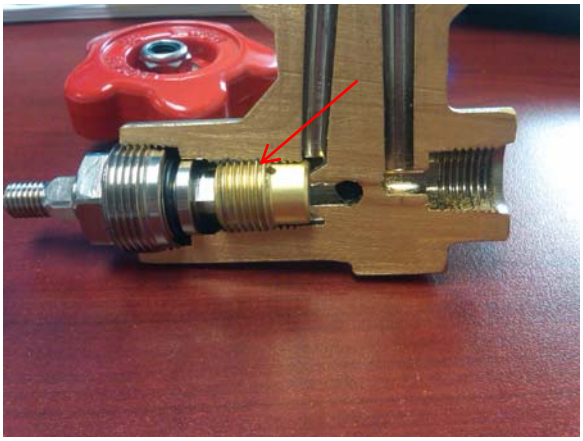
Youngdo Failure Mode

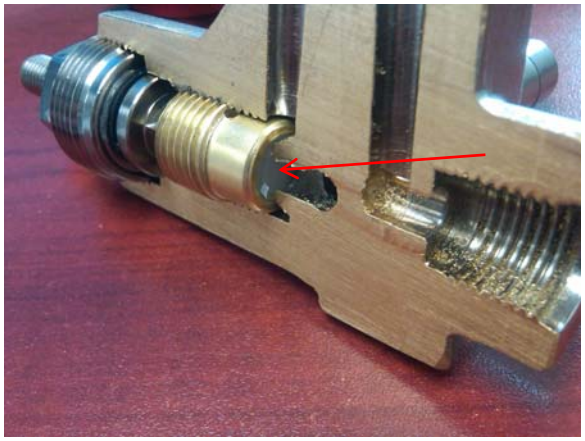
Youngdo Failure Mode



Failure mode: Nylon disc (#2) comes lose from the brass stem (#3) and maintains outflow seal as pressure from the tank maintains force against the seat, causing valve to seal after hand valve is opened. Valve will likely leak through the stem at the handle during this condition, but it may be very small depending on sealing of threads. Failure mode occurs if seat disc isn't retained by the brass stem.

Note: In failure condition, stem assembly is still under pressure even though no gas will flow from the valve.





PE13-039

AGILITY

7/31/2013

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Agility fuel systems

8D Corrective Action Request (CAR)

CAR Number	**CAR20121026**	CAR Owner	[redacted]	Date: 10/26/12
D1 - TEAM	Don Fenton	Yosh Coy	Chris Forsberg	
NCR Associated With This CAR? ☐ Yes .	NCR Number		☒ No	

Source of Request:

☒ Customer Complaint - Customer Name: Waste Industries Complaint No. N/A

☐ Internal Issue ☐ Supplier Issue Supplier:

☐ Internal Audit ☐ External Audit

Model No. N/A Serial No. N/A Part/Asy No. 21006001 (RHS)

Manufacturing Location: ☒ Anniston ☐ Fontana ☐ Kelowna ☐ Santa Ana

Installation Location: ☒ Anniston ☐ Fontana ☒ Other:

If this is for a customer complaint:

D3 Response Due: N/A D5 Response Due: D8 Response Due: 10/29/2012

D3 Completion Date: D5 Completion Date: D8 Completion Date:

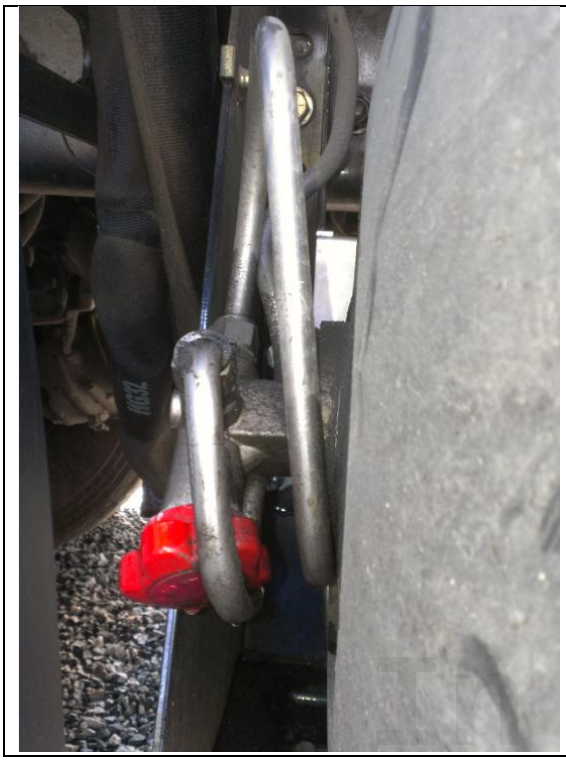
Does customer require reporting corrective action through their internet portal? ☐ Yes ☒ No

In Process

D2 – DEFINE THE PROBLEM/NONCONFORMANCE			
What is the nonconformance?	Why is it a nonconformance?	What is the evidence?	
Tank not properly retained in structure	Loose mounting straps not preventing the tank from moving.	Rotated tanks, damaged tubing.	
System or Part Number	21006001 (RHS)	Serial or Lot Number	NA
Suspected Quantity	10 pods	Date produced/received	May 2012

Attach Photos If Available:

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List what is known	1. Assembly techniques have been modified since the time of these installations. Techniques applicable at time of installation were not correctly followed. 2. If the strap bolt is not torqued properly, the tank will move. 3. Correct J-bracket isolating rubber was not used. 4. Did not have the new counterbore strap pin, PN: 21000160 5. Did not have the new torque procedure requiring a re-torque after four hours. 6. The tensioning nuts were not loosening during operation.
List what is not known	1. Installed with proper torqueing procedure 2. Is this application in an unusually severe application? What was the duty cycle?

Repeat Issue? ☒ Yes ☐ No If yes, previous CAR No. N/A

D3 - CONTAINMENT INVESTIGATION & ACTIONS TAKEN Use With Every Customer Complaint & Internal Issue

Containment Location	Responsibility	Actions & Results	Due Date
Customer site, 10 vehicles, vin numbers are 10312-10317 and 10321-10324	Agility	Dispatched a service crew to customer site. All units will be assembled utilizing the correct assembly process.	10/27/2012
	Agility	Re-check. Ensure second torque is applied after a minimum of four hours as the rubber isolators take a set. Two tanks showed signs of rotation.	11/1/2012 to 11/7/12
	Agility	Check strap tensioning nut torque daily.	11/7/12 to 11/26/12

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	Agility	Develop DOE for configurations to test. Tests 0-5 determined. Test 0 eliminated due to low confidence, and test 4 eliminated because the Agility-designed mounting bracket had a different mounting bracket hole pattern than the existing J-bracket.	
	Agility	Test 1 – Added third strap of same design as the original two straps. Straps loosening daily but not due to tensioning nut movement. No spin due to torqueing daily. Rubber movement. Eliminated configuration.	11/12/12 to 11/26/12
	Agility	Test 2 – Third strap, and SikaFlex all around. Straps loosening daily. No rubber movement. Very difficult to remove the tank with SikaFlex all around. Eliminated configuration.	11/10/12 to 11/26/12
	Agility	Test 3 – Third strap, 3 Belleville washers. Straps loosening daily. Rubber movement. Eliminated configuration.	11/14/12 to 11/26/12
	Agility	Test 5 – New SS strap, 8 Belleville washers, SikaFlex bond the rubber isolators to the J-bracket and strap but not to the tank, and replace lower strap mounting bolt with a grade 9 bolt (found several of the grade 8 bolts bent). Only visual inspection… no re-torqueing beyond the 4-hour re-torque in the assembly procedure. Completed converting all systems to this configuration as of 12/12/12.	11/26/12 to 12/12/12
Other installations	Agility - Heil	Visually check other installations for tank spin. Two tanks were found to have spun at Veolia in Evansville, IN. Materials and technicians are on-site updating installation with the new SS strap, 8 Belleville washers, SikaFlex bonded rubber isolators to the J-bracket and strap but not to the tank, and grade 9 lower strap bolt. These units will remain with 2 straps.	12/17/12

In Process

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Agility fuel systems

8D Corrective Action Request (CAR)

D4 - ROOT CAUSE ANALYSIS (RCA)

RCA Tools Used: ☐ 5 Why ☒ Fish Bone Diagram ☐ Other:

Summary of Root Cause:

The strap configuration was not adequately holding the tank in place during operation. In conjunction, the rubber was slipping out of position and thus exacerbating the situation.

Investigate the following as they apply to the problem/nonconformance

Element Or Activity	Comments/Information (Complete or Check N/A)	N/A
Customer Reports		☒
Internal Documentation (List doc's examined)	ENP-023 Side Mount Installation Instructions Rev. 0 at time of installation ENP-023 Side Mount Installation Instructions Rev. 1 (released after the installations occurred). Rev. 1 does not call for the new strap pin, PN: 21000160	☐
Tooling &/or Equipment	Properly calibrated torque wrench and allowance for 36" long extension and swivel adapter. The extension and adapter were found to produce 5 lb-ft torque loss.	☐
Operator & Other Employees - Including Training	Some operators may not have been properly trained/ supervised. Reviewed installation procedures.	☐
Material, Purchased Parts & Parts/Assemblies Made At Agility		☐
Measuring & Test Equipment	Stainless Steel strap with eight Belleville washer configuration was tested beyond 3000 fill cycles in the Kelowna test lab with no loss of torque/strap loosening.	☐
Data & Test Reports		☒

In Process

D5 – DETERMINE CORRECTIVE ACTIONS

List the solutions that address the root causes identified using RCA tools.

Action #	Root Cause - Defect	Corrective Action	Responsible	Target Date
1A	Incorrect J-bracket rubber isolator	Installed all new rubber isolators (J-bracket and strap)	Agility technicians	10/23/12
2A	Torque procedure	Re-torque four hours after initial torque	Agility technicians	10/27/12
3A	Strap Loading	Add third strap to spread the load.	Agility technicians	11/12/12
4A	Rubber movement	Bond rubber isolators to j-bracket and strap with Sika Flex.	Agility technicians	11/10/12
5A	Insufficient flex/give in system to account for tank expansion/contraction.	New stainless steel strap with ~18% elongation in conjunction with a stack of eight Belleville washers.	Todd Sloan	11/26/2012

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D6 – IMPLEMENT & VALIDATE THE CORRECTIVE ACTIONS List the corrective actions in the same order as D5.				
Action #	Final Corrective Action	Validation Method	Responsibility	Comp. Date
1A	Installed all new rubber isolators (J-bracket and strap)	Technician check	Thomas Owen, Mike Smith	12/12/12
2A	Re-torque four hours after initial torque	Technician record data	Thomas Owen, Mike Smith	12/12/12
3A	Add third strap to spread load	Technician check	Dustin Pierce	11/12/12
4A	Bond rubber isolators to J-bracket and strap with Sika Flex	Technician check	Thomas Owen, Mike Smith	12/12/12
5A	New stainless steel strap with ~18% elongation in conjunction with a stack of eight Belleville washers.	Technician check	Thomas Owen, Mike Smith	12/12/12

D7 – PREVENTING RECURRENCE

Determine what improvements in systems, processes and procedures would prevent the problem from recurring. Ensure that corrective action remains in place and is successful. Review & update the applicable documents/systems.

Description	Document Number(s)	Responsibility	Planned Completion	Actual Completion
System/process procedure				
Mfg work instruction	ENP-023 REV. 2	Andrew Durrant	1/11/2013	
Inspection plan/instruction				
Control plan				
DFMEA				
PFMEA				
Gage or test equipment				
Maintenance or PM plan				
Similar systems at this site				
Increase internal audit freq?				

Check the boxes if this problem/nonconformance and the corrective actions implemented impact other divisions?

☒ Anniston ☒ Fontana ☐ Kelowna ☐ Santa Ana

Communication date to the other divisions: 12/11/2012

Does the problem/nonconformance and the corrective actions implemented impact other suppliers of the same product/material?

☐ Yes ☒ No ☐ N/A If yes, who? _____

Communication date to other supplier(s):

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D8 – RECOGNIZE THE TEAM'S ACCOMPLISHMENTS
Lessons learned? Need to verify updated procedures are weighed against products in the field for modification to latest standard.

APPROVAL SECTION:

Role	Mgr	E-Signature	Date	Comments
CAR(PM) Owner	David Cate	[redacted]	1/8/2013	
GM Operations	Barry Peeples		1/9/2013	
Quality Manager	Eliot Dratch		1/9/2013	
VP Customer Sales	Jeff Scott		1/10/2013	
VP Engineering	Todd Sloan		1/10/2013	
Director Field Ops	Yosh Coy		1/18/2013	
Director-Eng. Pmgt	Don Fenton			
Customer Review	Bob McMackins - Heil			

In Process

PE13-039

AGILITY

7/31/2013

ENR-015-Old Side Mount Strap Cycle Issue-Rev00



OLD SIDE MOUNT STRAP CYCLE ISSUE- ENR-015

16/11/12

Author: A. Mahani	Revision: 0	Date Revised: November 16th , 2012
Approved by: D. Durrant		Date Issued: November 16th , 2012

DOCUMENT HISTORY

Revision	Description	Approved by	Date
00	First Release	D. Durrant	11/16/2012

EXECUTIVE SUMMARY

There are some claims about tank spinning of the old side mount system. After modifying some parts, still there are rare tank spinning reports. To study the issue based on the CNG tank expansion during filling, one set of the parts installed on the strap cycle tester and the issue was studied. It was observed that the strap was in the plastic zone and after a couple cycles, the initial torque of the strap reduced during cycling and caused the grasping force on the tank reduced which is the main factor of the tank spinning.

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Figure 5-Final configuration 6

1 INTRODUCTION

CNG tanks have radial expansion during filling. The expansion of composite tanks is larger than other tanks. The accessory parts that hold the CNG tank should be designed with this consideration, otherwise huge stress on parts can generate plastic deformations or fractures. If plastic deformation happens, the grasping force to hold the tank will be reduced and the tank will move or rotate. Following the old side mount was tested with different configurations.

2 TESTS:

2.1 New Rubber with old parts:

In this test, only the new modified rubber was used. The preload torque of the strap nut was 40lb.ft, and in different tank expansions based on the different pressure, the preload torque was measured.

Tank Pressure (psi)	Tank Diameter in inches	Tank Diameter in mm	Strap nut Torque in ft.lb
0	25.16	639.064	40
500	25.18666667	639.7413333	45
1000	25.21333333	640.4186667	50
1500	25.24	641.096	55
2000	25.26666667	641.7733333	60
2500	25.29333333	642.4506667	80
3000	25.32	643.128	110
3500	25.34666667	643.8053333	140
4000	25.37333333	644.4826667	150
4500	25.4	645.16	160

After measurement and some cycles, it was observed that the initial torque reduced to 30lb.ft from 40lb.ft. It seemed there was a plastic deformation on some parts. After turning the nut about ¾ turn, the torque was set 40lb.ft again. After 550 cycles full expansion (up to 4,500 psi- 3 cycles in a minute) again the torque was reduced to 30lb.ft , and it needed 2 turns to set to 40lb.ft. In the next step, the initial torque set to 50lb.ft and after 3087 cycles, the torque reduced to 30lb.ft , and it needed about 1 ¼ turn to set to 50lb.ft.



Figure 1-New rubber with the old strap on cycle test

Possible parts for plastic deformation:

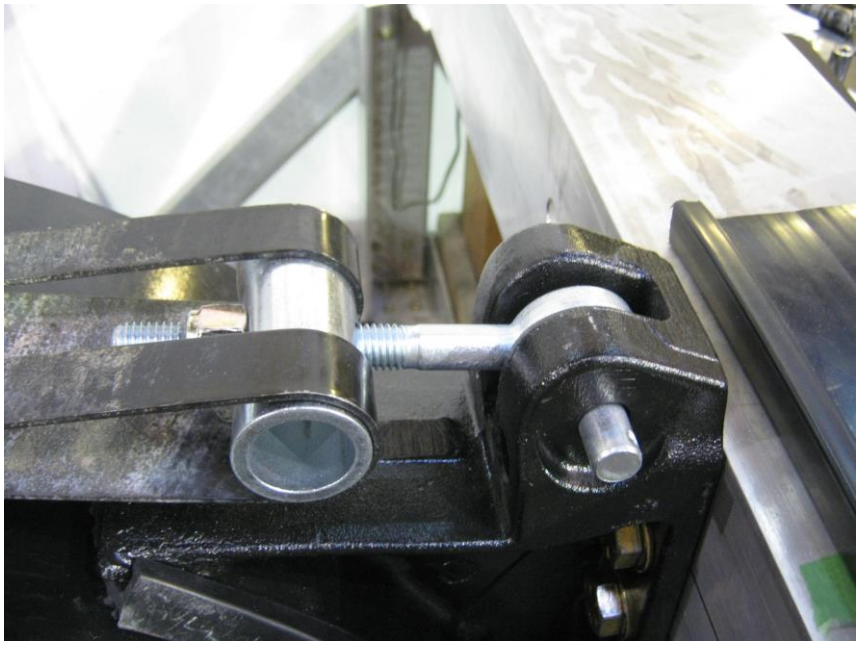


Figure 2- Hollow strap bush- suspicious for plastic deformation

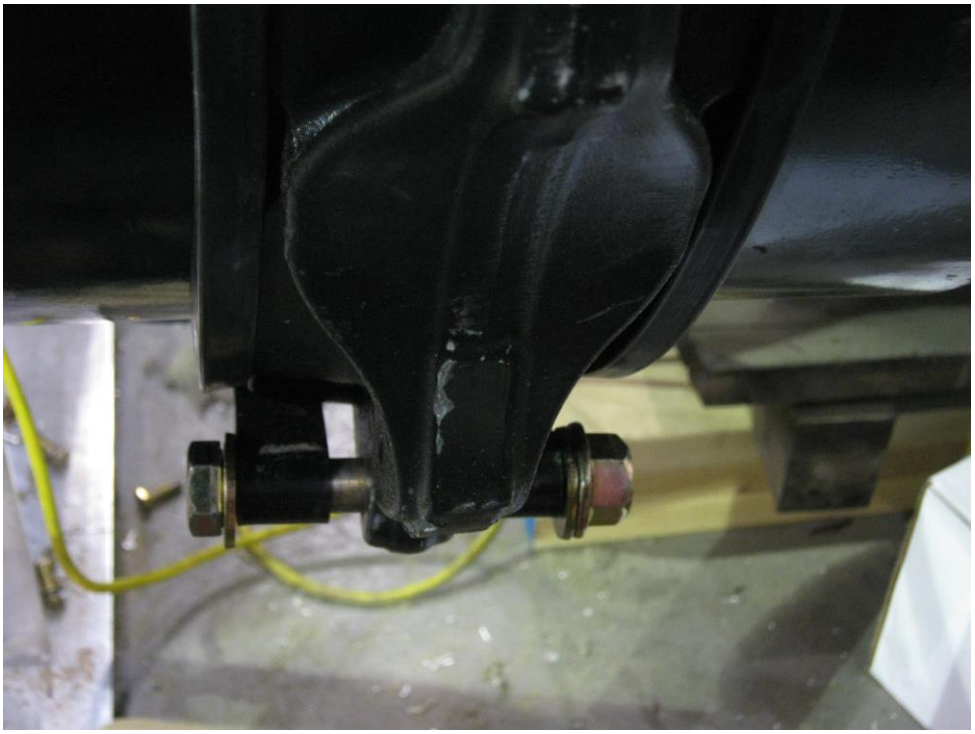


Figure 3- Bottom bolt of strap in bending instead of shearing

2.2 New Rubber with New strap bush and Belleville washers:

In order to compensate the large radial expansion and reduce the stress on the parts, Belleville washers added to this test. For this purpose, the new strap bush (half a solid cylinder) that can allow more space for Belleville washers and doesn't have plastic deformation on high loads, added to the system too. First 6 Belleville washers P/N: 10M112177 (Solon) in series were used:

Part Number 10M112177

Inside Diameter	**Min** 0.644" **Max** 0.653"
Outside Diameter	**Min** 1.478" **Max** 1.500"
Thickness	**Min** 0.112" **Max** 0.122"
Overall Height	0.145"
Listed Deflection	0.028"
100% Load	5300.0 lbs
Torque	54.40 ft. -lbs
Material	17-7PH Stainless Steel

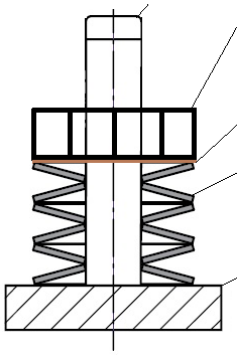


Figure 4-Belleville washers Qty 6

After 3,505 cycles, the tightening torque reduced from 50lb.ft to 40lb.ft and it needed 1/3 turn to set to 50lb.ft.

Another Belleville washer P/N: 1020125301 (Solon) was selected and 4 of it in series were used. After 532 cycles the initial torque reduced from 50lb.ft to 40lb.ft and it needed 1 ¾ turn to set to 50lb.ft. After 3650 cycles, there was no torque loss. The initial torque was set to 65lb.ft and after continuing to 3823 cycles, the initial torque reduced to 30lb.ft from 65lb.ft and it needed 5 complete turns to set to 65lb.ft. After continuing to 4800 cycles, the initial torque reduced to 40lb.ft and it needed 1 ½ turn to set to 65lb.ft.

2.3 New SS301 ½ hard strap and 5/8 bolt grade 9:

The new SS301 half hard strap with 5/8 bolt grade 9 (bottom strap bolt) were used with 6 Belleville washers P/N: 10M112177 (Solon) in series. The initial torque was 50lb.ft. After about 700 cycles, the torque reduced to 40lb.ft and it needed ½ turn to set to the initial torque (50lb.ft). After continuing for 365 cycles, the initial torque reduced to 40lb.ft again.

A new set of SS301 half hard strap with 5/8 bolt grade 9 were tested with 8 Belleville washers P/N: 1020125301 (Solon) – 2x4 in series:

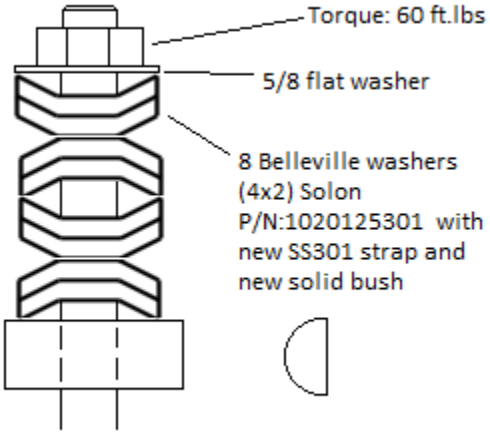


Figure 5-Final configuration

After 123 cycles, the torque didn't reduce and it was 60lb.ft as the initial setting. After continuing to 2825 cycles, the initial torque didn't reduce and it was 60lb.ft.

3 CONCLUSION:

The final configuration according to the figure 5 with grade 9 bolt (5/8) is a solution for the mentioned issue.

PE13-039

AGILITY

7/31/2013

ENP-051 Rev A Old Side Mount Installation Instructions

Agility fuel systems™



FREIGHTLINER SIDE MOUNT INSTALLATION ENP-051 01/08/13

Author: C. Forsberg	Revision: A	Date Revised: January 8, 2013
Approved by: T. Sloan		Date Issued: December 21, 2012

1 FIGURES

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Figure 24: 2nd Tank Installation 23
Figure 25: Side Mount Cover 23

2 INTRODUCTION

This document details revisions to the assembly and installation requirements for the Agility 25x80 CNG fuel tank. These instructions pertain to a side-mounted installation on the vehicle chassis. A typical installation is shown in Figure 1.



Figure 1: Side Mount Installation

CAUTION: Anyone performing this installation must be trained and certified for Swagelok fuel fitting installation. Installation personnel must also be trained and certified to meet the requirements of the latest edition of NFPA 52. The system installation shall meet all applicable codes and regulations required by the local authority having jurisdiction.

Handle all components with care. ANY impact or damage to the fuel tank or fuel system components MUST be reported to Agility immediately. Damage to the fuel tank from dropping, impact, etc. may not be detectable during a visual inspection, and requires immediate inspection by Agility. Any damage that is not reported may compromise the physical integrity of the fuel tank, resulting in serious personal injury or death.

Agility shall not be held responsible for damage to components during installation, or installations not meeting the applicable codes and regulations.

3 PARTS LIST

The following parts are required for a single tank installation: these components are critical and they must be installed to Agility specifications:

QTY 1 – 25x80 Type 4 CNG fuel tanks (10105001)
QTY 2 – 25” j-bracket and strap assembly (21000010)
QTY 2 – Grooved rubber isolator for straps (21000148)
QTY 1 – Tank Manual shut-off valve (10300100)
QTY 1 – PRD manifold assembly (21004005)
QTY 1 – Semicircular strap pin - Agility PN: 21000160
QTY 1 – SS Strap - Agility PN: 21000161_RevA purchased from Kelowna's strap supplier
QTY 8 – Belleville Washers - Supplier PN: 1020125301 purchased from Solon Manufacturing
QTY 1 – 5” 5/8"-11 Grade 9 zinc plated bolt - PN: 90201A550 from McMaster Carr or equivalent
QTY 2 – 5/8”-11 zinc plated Nylock Nut (eye bolt and lower strap bolt)
QTY X – SikaFlex to bond isolators to J-Bracket and strap
QTY 1 – Grooved rubber isolator for j-bracket (Agility PN: 21000149)... Cut to 29.5" long
QTY 1 – Grooved rubber isolator for j-bracket (Agility PN: 21000148)

The following additional parts are included in the standard Agility kit:
QTY 1 – Agility tank frame
QTY 1 – Agility aluminum sheet metal cover
QTY 1 – Agility steel bottom cover
QTY 1 – Agility steel heat shield
QTY 2 – Tank steps (if applicable)
Miscellaneous mounting hardware

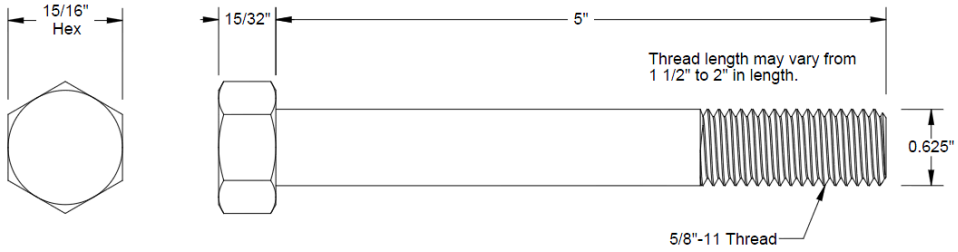


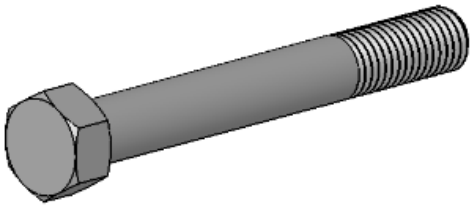
CAUTION: With the exception of the lower strap bolts, all hardware used in this installation MUST be at least Grade 8 or equivalent, with corrosion-resistant plating. Any reference to nuts or bolts in this procedure requires the use of Grade 8 or equivalent, plated hardware. Nuts shall be prevailing torque nuts (top lock nut) with corrosion-resistant plating.

CAUTION: The lower strap bolts must be a 5/8" Grade 9 bolt. Grade 8 bolts are not acceptable as they are prone to bending as illustrated in Figure 2. Use the McMaster-Carr bolts illustrated in Figure 3.



Figure 2: Bent 5/8" Grade 8 Bolt





McMASTER-CARR CAD	PART NUMBER 90201A550
http://www.mcmaster.com © 2008 McMaster-Carr Supply Company	Zinc Yellow-Chromate Plated Grade 9 Steel Hex Head Cap Screw
Unless otherwise specified, dimensions are in inches. Information in this drawing is provided for reference only.	

Figure 3: McMaster-Carr Grade 9 Bolt

4 INSTALLATION INSTRUCTIONS

The following instructions detail the preparation and installation of the CNG tank on the left side of vehicle. If the installation requires a 2nd tank on the right side of chassis, follow the same procedures as detailed below

4.1 Frame Drilling

Drill or punch the chassis rails as per Agility drawing below.

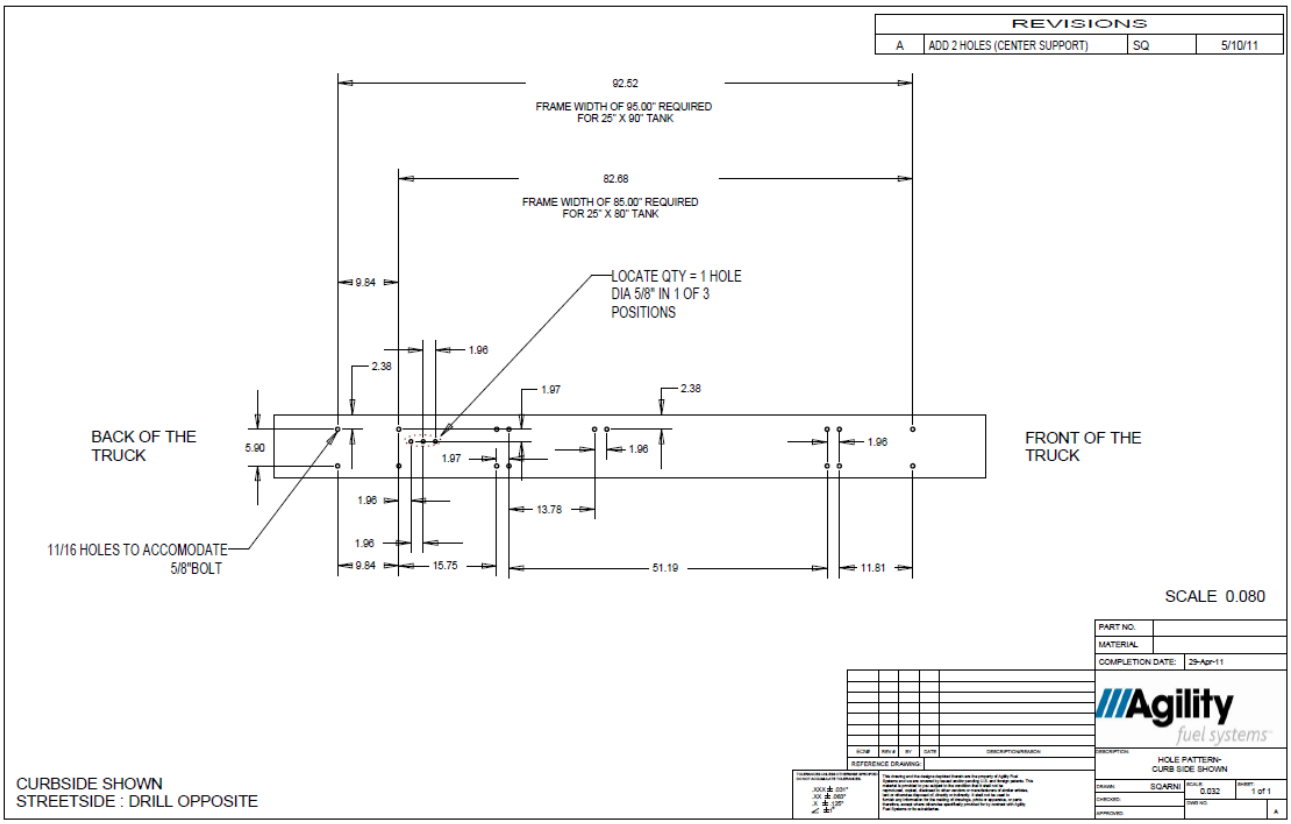


Figure 4: Frame Drilling Drawing

The FMM requires approx. 14" of clean frame rail to provide adequate clearance to open door.

A minimum 1.5" clearance is required from forward and aft bolt holes to chassis components (85" and 95" overall frame rail space is required for the 25x80 and 25x90 tanks respectively). For clearance to moving parts (i.e. Front leaf spring shackle), it is recommended that there is 2.5" clearance from the forward bolt hole.

4.2 Bracket Installation

Refer to the figure below for the required j-bracket hardware.

Item 4 is Agility rubber extrusion Part Number 21000149 cut to 29.5” long.

Item 5 is Agility rubber extrusion Part Number 21000148.

Item 7 must be substituted for the Agility semicircular strap Part Number 21000160.

Item 14 must be substituted a 5/8”-11 Grade 9 zinc plated bolt Part Number 90201A550 from McMaster-Carr or equivalent

Item 27 must be substituted for a stainless steel strap Part Number 21000161

Not Pictured:

QTY - 8 Belleville washers

QTY – 1 5” 5/8”-11 zinc plated nylock nut (eye bolt and lower strap bolt).

QTY – Sikaflex

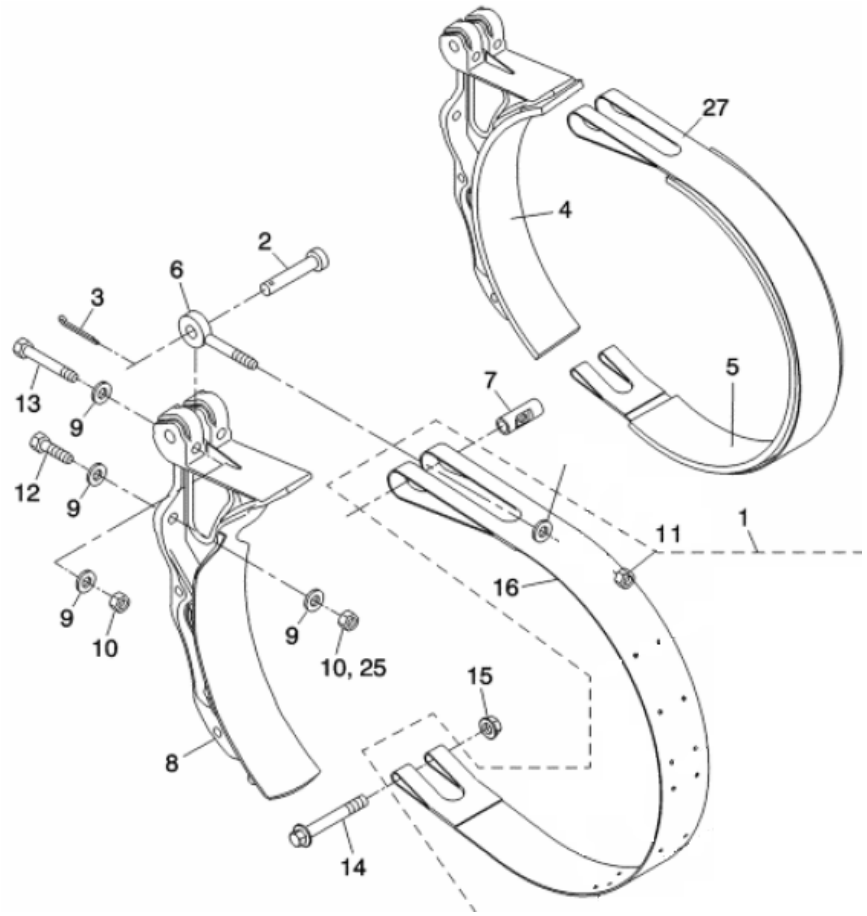


Figure 5: Bracket Installation

Install QTY 2 j-brackets on the chassis using **1 bolt (5/8" diameter Grade 8)** for the **top** of each bracket and **1 bolt (5/8" diameter grade 9)** for the **bottom** of each bracket, 4 bolts altogether. Use an equivalent Grade prevailing torque nut (ex. Grade C nut). Be sure to use the outermost 4 bolts on the bracket bolt pattern. Torque 5/8" bolts to 185 ft-lbs.

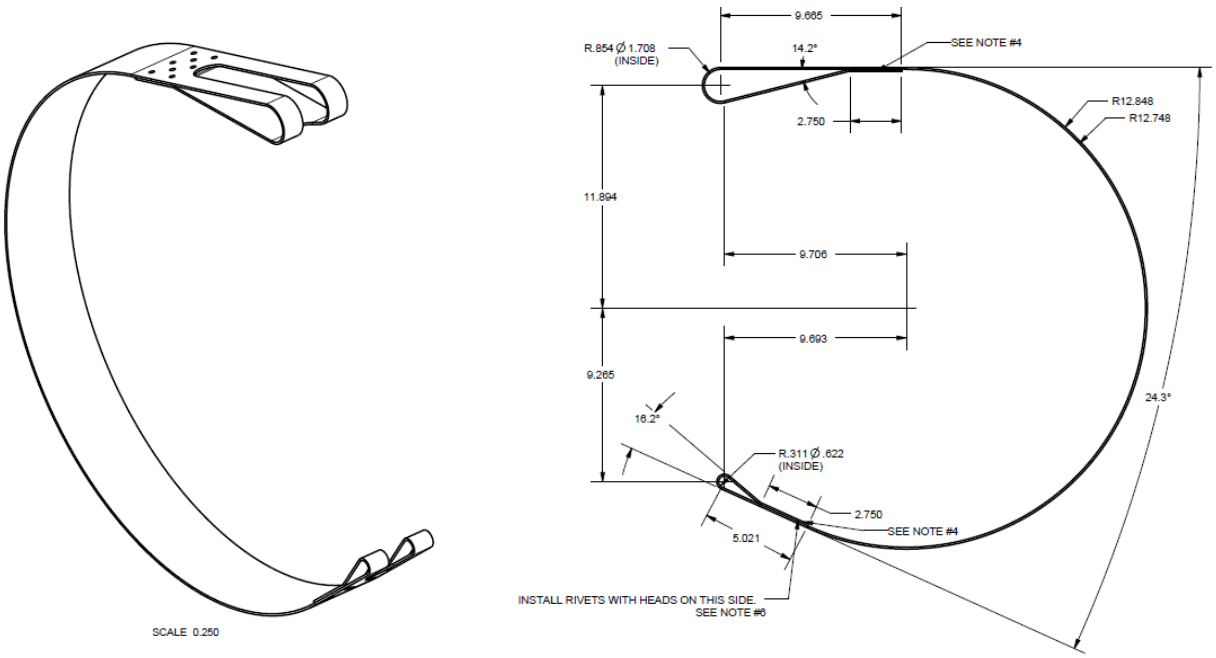


Figure 6: Stainless Steel Strap

Replace the steel strap with a **stainless steel strap**. The strap is longer to allow the use of eight Belleville washers. The combination of the stainless steel strap and eight Belleville washers provides enough give on the restraining system to allow for tank expansion.

Install grooved rubber isolators 21000148 and 21000149 on the strap and bracket. See Figures 7 and 8 for details.

Cut J-bracket rubber isolator to 29.5" in length and assemble extending beyond the top of the J-bracket to help assembly process. This allows for downward movement during installation and torqueing.

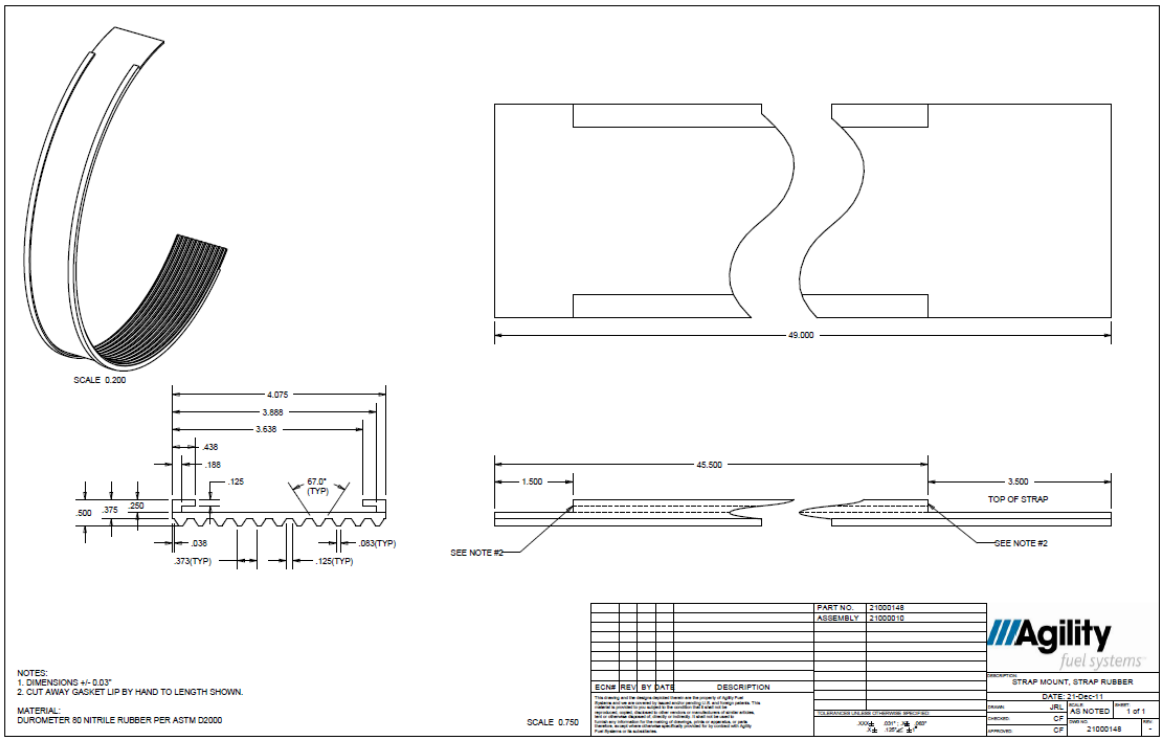


Figure 7: Rubber Isolator 21000148

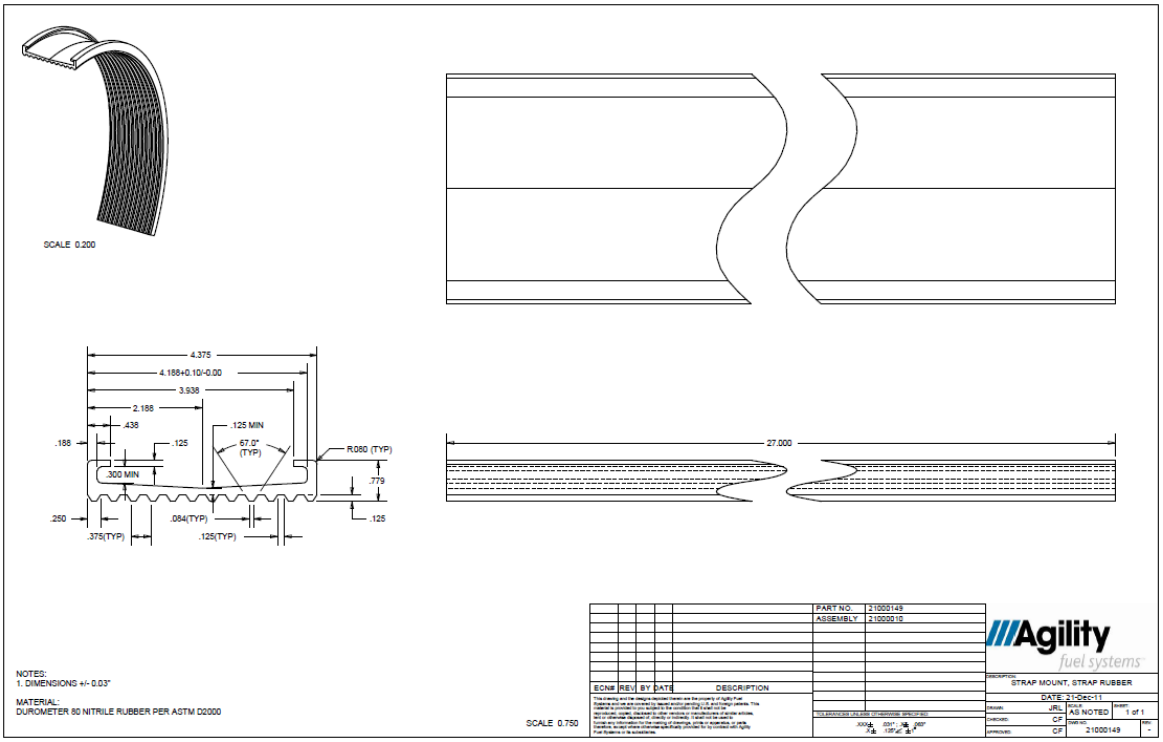


Figure 8: Rubber Isolator 2100149 Cut To 29.5” Long

Bond isolators to J-Bracket and straps with SikaFlex to prevent rubber from working its way off during operation. Robber movement is most common on the J-Bracket but we have also seen it on the strap.

Note it is normal for rubber isolators to shift as SikaFlex is setting, however once set the isolators will remain stationary, See Figure 9.



Figure 9: SikaFlex Setting at Installation

CAUTION: If SikaFlex is not used, isolators may remain stationary during installation but are prone to sliding during vehicle operation and fueling/defueling procedures.



Figure 10: Isolator Movement without SikaFlex



Figure 11: Tank Spin Without SikaFlex

For Belleville washer orientation see Figure 12. For ease of installation the washers can be taped together as illustrated in Figure 13.

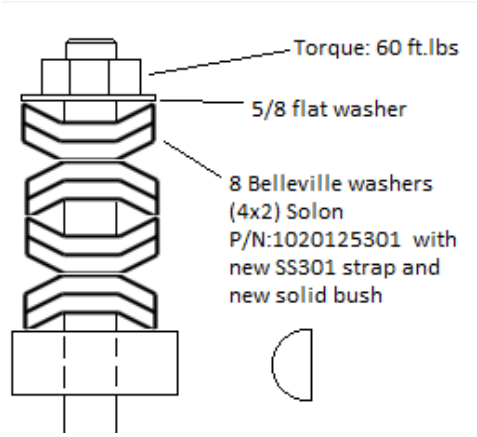


Figure 12: Belleville Washer Orientation



Figure 13: Belleville Washers Taped Together

F7102
Approved By: SCF
Approved Date: 11-4-2010

SOLON MANUFACTURING CO.
Washer Division
Specifications Report
(Inches)

Part Number: 1020125301 *Bolt Size:* 5/8 *APW:* 0.030128 *Lbs./Pc.*

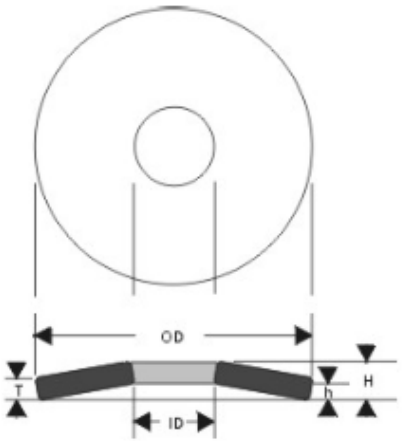
	Inside Diameter (ID)	Outside Diameter (OD)	Thickness (T)	Overall Height (H)	Deflection (h)	Load (Lbs)
Catalog Specs:	0.644	1.250	0.125	0.159	0.014	5,500
Tolerances:						
Min	0.644	1.230	0.121	0.150	0.012	
Max	0.653	1.250	0.129	0.165	0.016	

Torque in Ft./Lbs.: 41.5 *Notes:* ALSO M16-32-3.2-301

Material Type: 301

Material Description

301 Stainless Steel (ASTM A666);
Rockwell Hardness: Rc 38-45
Operating temperature range from -400° to 550° F.
For indoor / outdoor service, electrical and corrosive atmospheres.
This material is slightly magnetic.
Finish: Scale free plain finish with deburred edges.



425 Center Street
Chardon, Ohio 44024
Phone: 800-323-9717; 440-286-7149
Fax: 440-286-9047
www.solonmfg.com

Monday, November 26, 2012

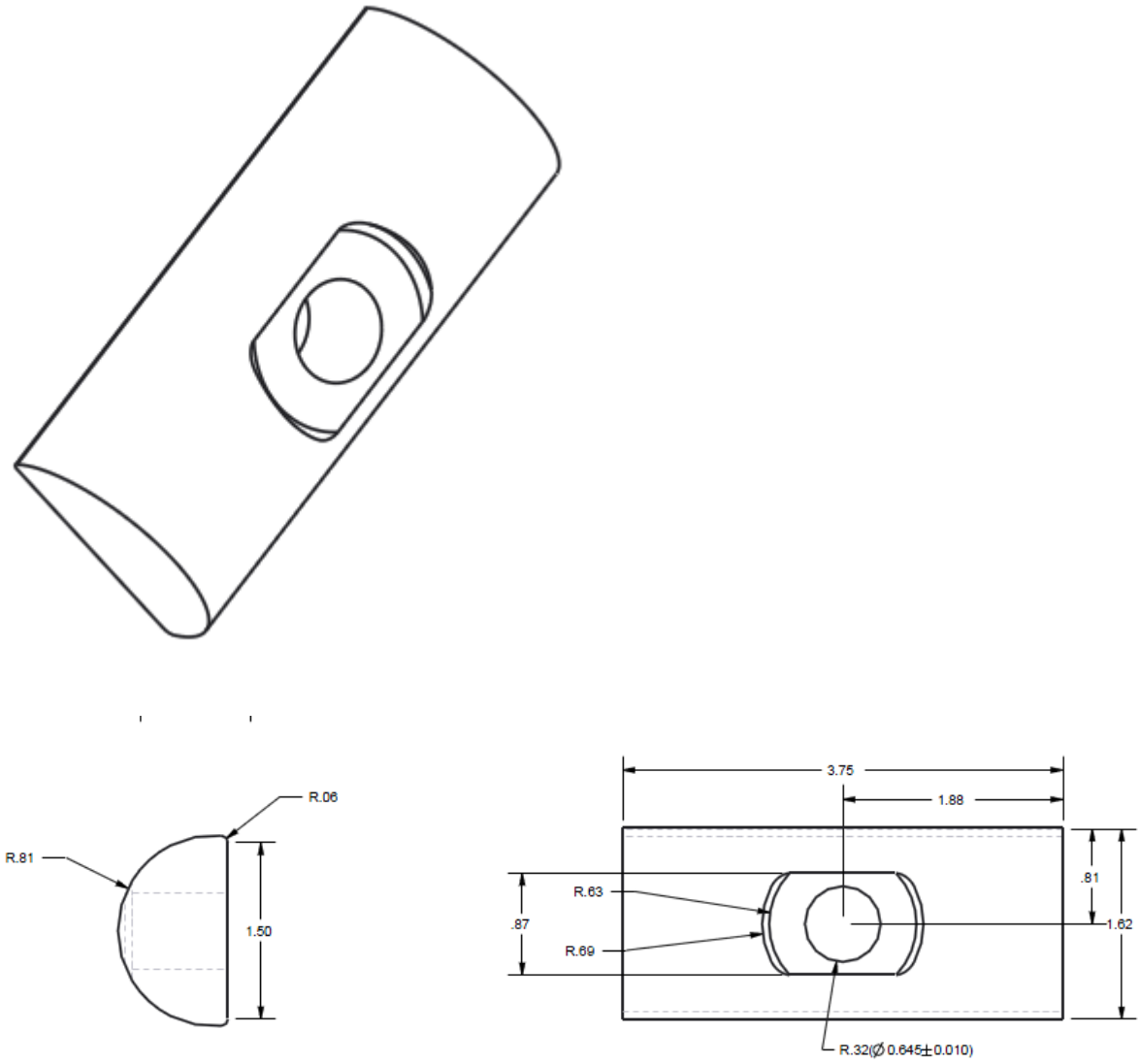


Figure 14: Semicircular Star Pin 21000160

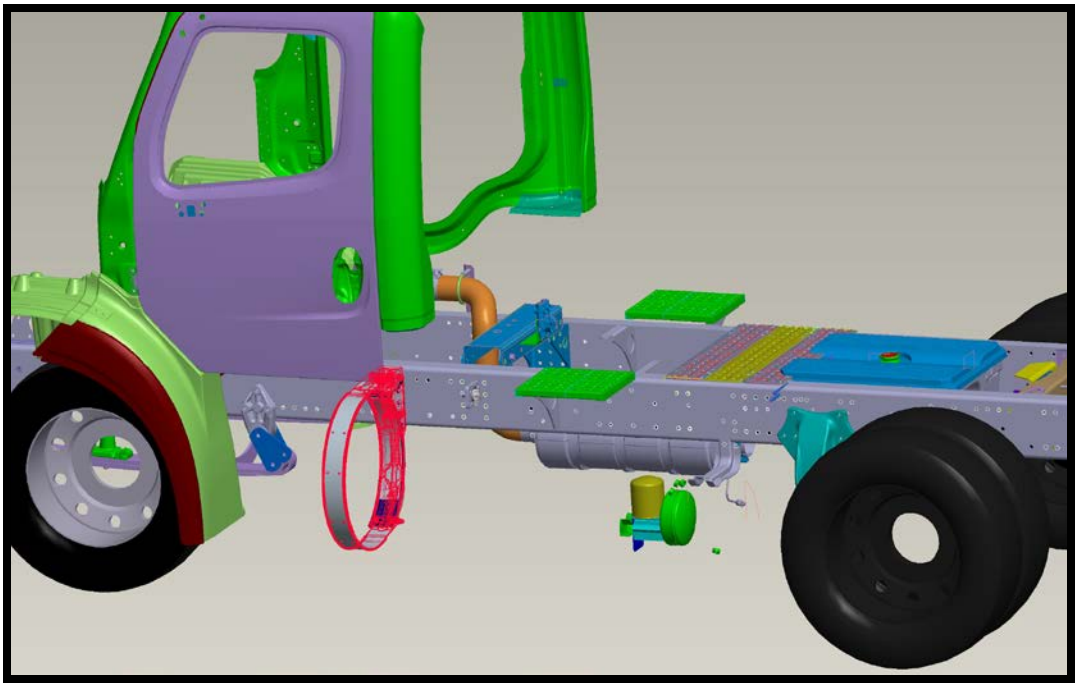


Figure 15: Front J-Bracket Installation

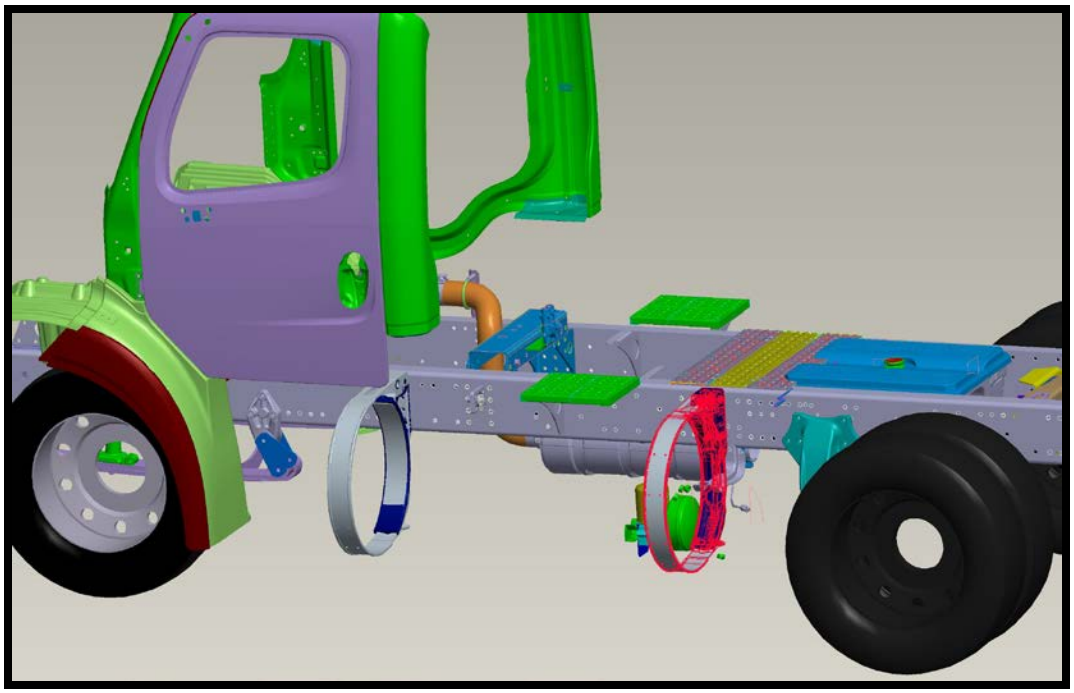


Figure 16: Back J-Bracket Installation

4.3 Frame Installation

Install the steel frame using QTY 4 bolts: 2 bolts each end of frame (5/8” diameter Grade 8). Torque 5/8” bolts to 185 ft-lbs.

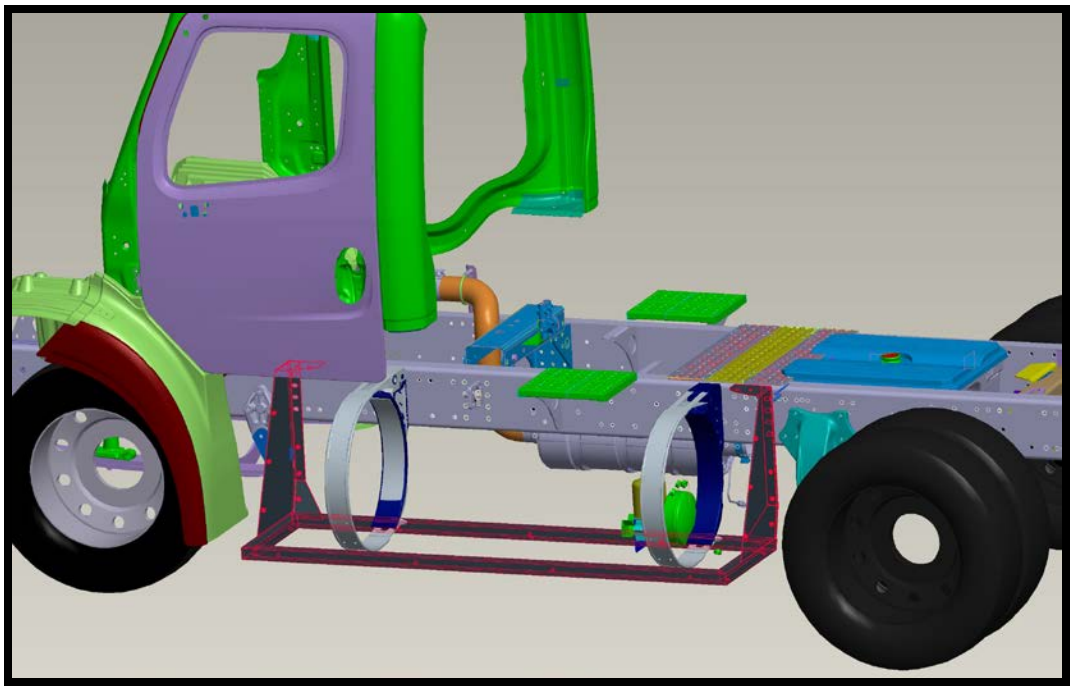


Figure 17: Frame Installation

4.3.1 Bottom Cover Installation

Install the lower steel cover onto the bottom of the frame. Attach using 3/8" bolts. Torque bolts to 35-40 ft-lbs. Use lock washers where bolts are not installed into prevailing torque nuts.

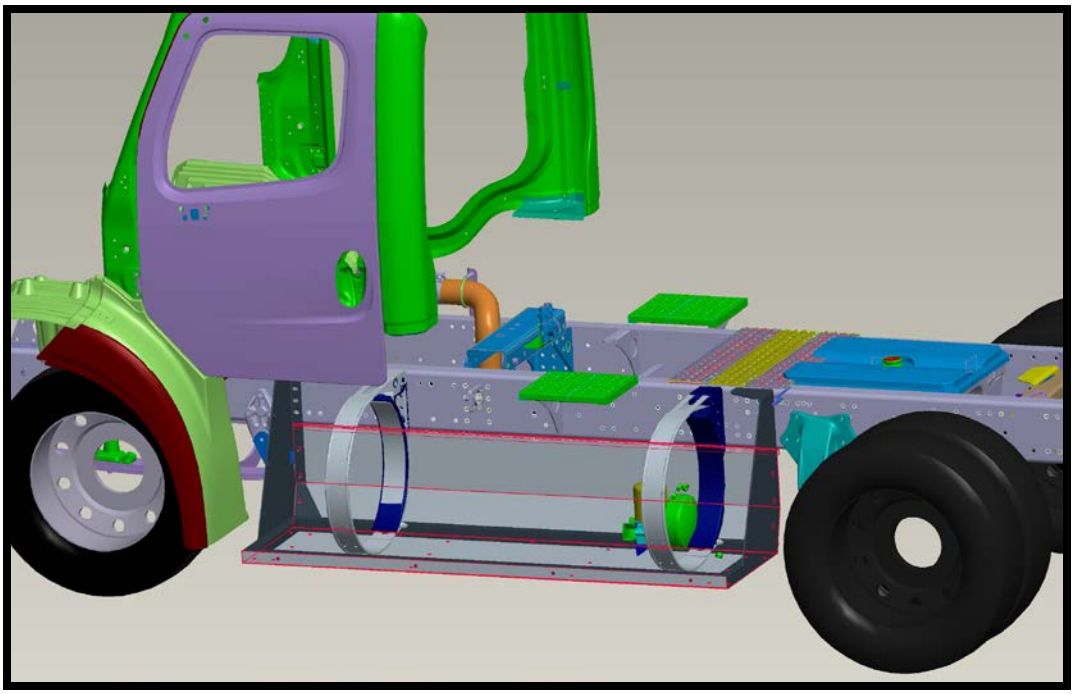


Figure 18: Bottom Cover Installation

4.4 Tank Installation

Install the tank in the j-brackets using the included hardware. The open port on the tank must point towards the rear of vehicle. Use the torque value listed in Figure 12, 60 ft-lbs. Refer to Figure 19 for an end view of the tank installed in the j-brackets.

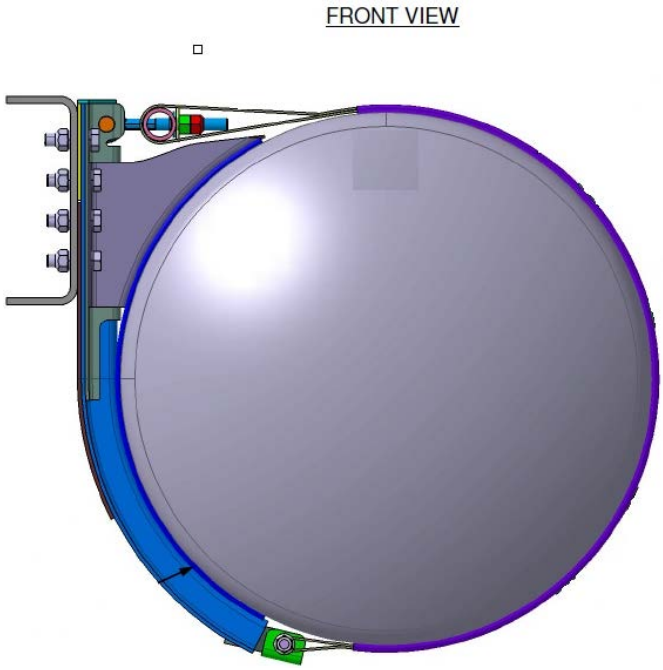


Figure 19: Tank Installation Front View

NOTE: the use of extensions and adapters can result in torque loss, torque should be verified with an appropriate testing device.

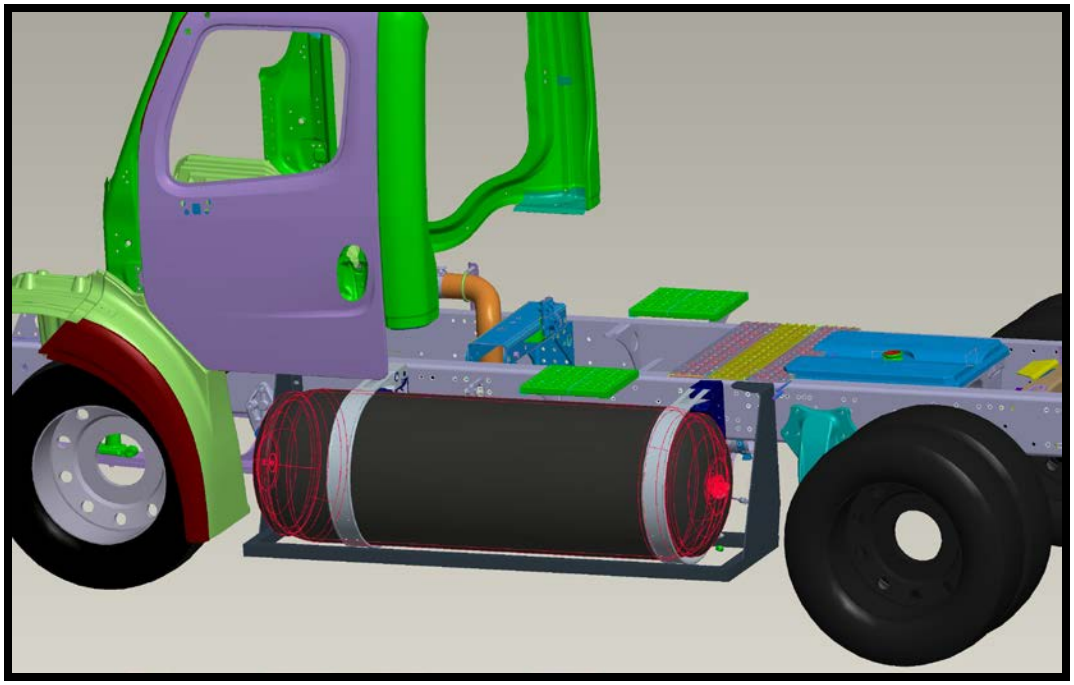


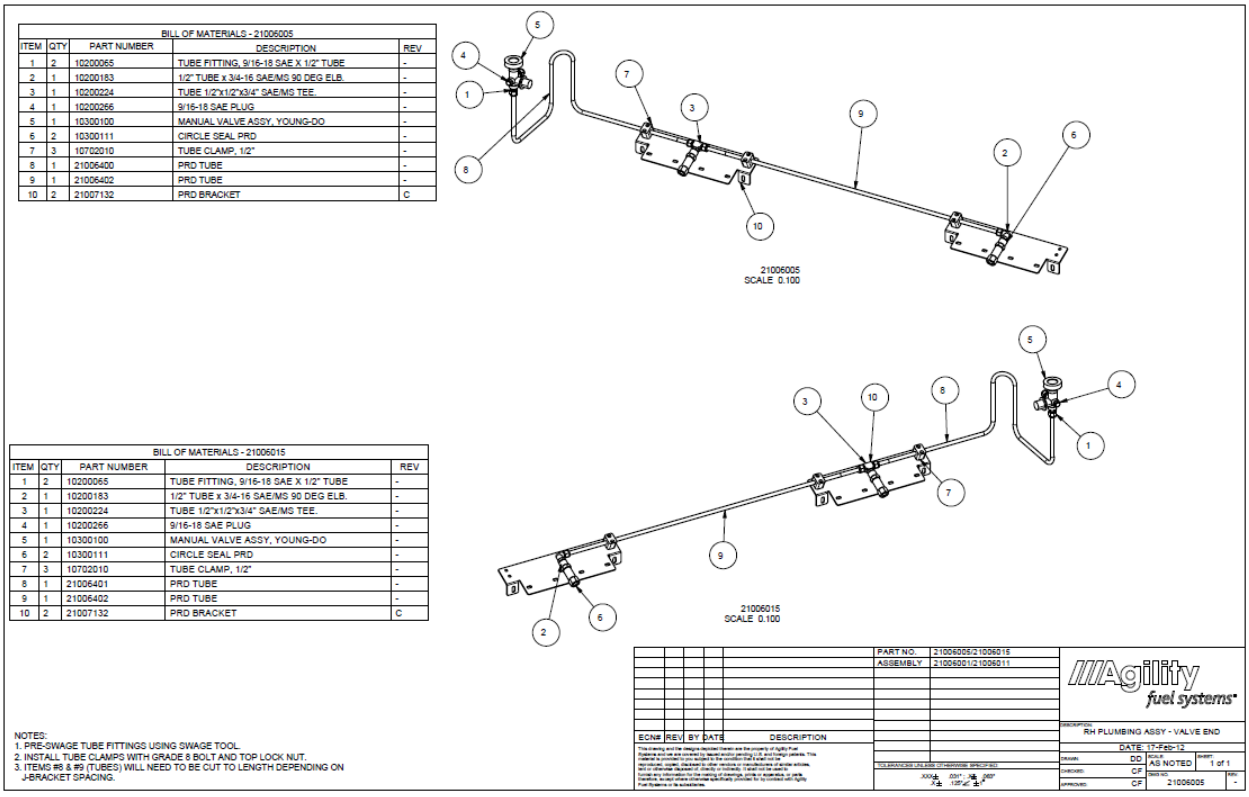
Figure 20: Tank Installation Side View

Ground clearance of vehicle shall be minimum 9 inches from ground to bottom of tank at fully laden weight. The fuel tank cannot be the lowest point on the chassis.

Orient the tank valve so that the valve handle is on top. The Valve must be within +/- 2 degrees of vertical.

4.4.1 PRD Manifold Installation

Install the PRD manifold into the valve. Note that the tube must be connected to a live port on the valve: this manifold tube connection MUST be connected to the bottom port on the Young-Do tank manual valve (with red handle). Please contact Agility for specifications on installing a tank with a GFI, Sherwood, or OMB manual valve on the tank.



BILL OF MATERIALS - 21006005

ITEM	QTY	PART NUMBER	DESCRIPTION	REV
1	2	10200065	TUBE FITTING, 9/16-18 SAE X 1/2" TUBE	-
2	1	10200183	1/2" TUBE x 3/4-16 SAE/MS 90 DEG ELB.	-
3	1	10200224	TUBE 1/2"x1/2"x3/4" SAE/MS TEE.	-
4	1	10200266	9/16-18 SAE PLUG	-
5	1	10300100	MANUAL VALVE ASSY, YOUNG-DO	-
6	2	10300111	CIRCLE SEAL PRD	-
7	3	10702010	TUBE CLAMP, 1/2"	-
8	1	21006400	PRD TUBE	-
9	1	21006402	PRD TUBE	-
10	2	21007132	PRD BRACKET	C

21006005
SCALE 0.100

BILL OF MATERIALS - 21006015

ITEM	QTY	PART NUMBER	DESCRIPTION	REV
1	2	10200065	TUBE FITTING, 9/16-18 SAE X 1/2" TUBE	-
2	1	10200183	1/2" TUBE x 3/4-16 SAE/MS 90 DEG ELB.	-
3	1	10200224	TUBE 1/2"x1/2"x3/4" SAE/MS TEE.	-
4	1	10200266	9/16-18 SAE PLUG	-
5	1	10300100	MANUAL VALVE ASSY, YOUNG-DO	-
6	2	10300111	CIRCLE SEAL PRD	-
7	3	10702010	TUBE CLAMP, 1/2"	-
8	1	21006401	PRD TUBE	-
9	1	21006402	PRD TUBE	-
10	2	21007132	PRD BRACKET	C

21006015
SCALE 0.100

NOTES:
1. PRE-SWAGE TUBE FITTINGS USING SWAGE TOOL.
2. INSTALL TUBE CLAMPS WITH GRADE 8 BOLT AND TOP LOCK NUT.
3. ITEMS #8 & #9 (TUBES) WILL NEED TO BE CUT TO LENGTH DEPENDING ON J-BRACKET SPACING.

ECN#	REV.	BY	DATE	DESCRIPTION

PART NO. 21006005/21006015
ASSEMBLY 21006001/21006011

Agility fuel systems

DESCRIPTION: RH PLUMBING ASSY - VALVE END
DATE: 17-Feb-12
DRAWN: DD | SCALE: AS NOTED | SHEET: 1 of 1
CHECKED: CF | DWG NO.: 21006005 | REV: -
APPROVED: CF

Figure 21: PRD Manifold Drawing

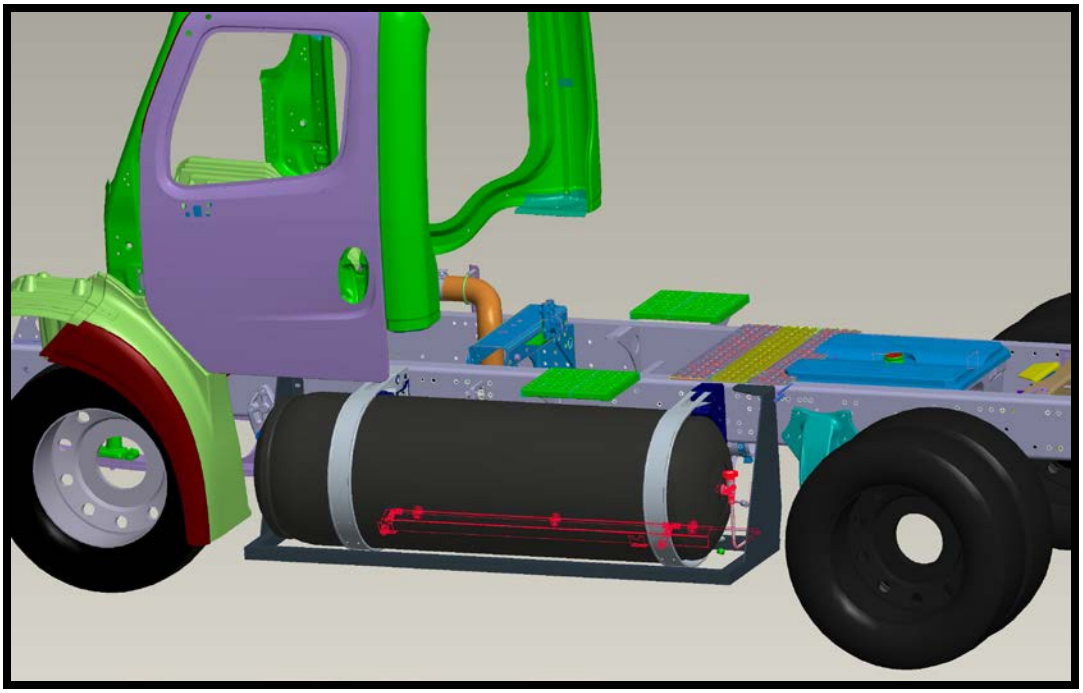


Figure 22: PRD Manifold Installation

4.5 Fuel Module Installation

Drill chassis and install the Fuel Management Module (FMM). Bolt the module to the chassis using QTY 4 – 3/8" bolts. Make the following connections to the vehicle:

- Low pressure fuel line to engine low pressure filter
- Electrical connections to vehicle electrical harness
- Coolant connections to vehicle coolant loop

4.6 Fuel Plumbing Connections

Make the high pressure fuel connections from the tanks to the FMM. If using a 2-tank system, make the high pressure fuel connection from tank to tank. Follow standard Swagelok procedures. Installing personnel must be trained and certified by Swagelok for fitting installation.

4.7 Cover Installation

Install the aluminum sheet metal cover assembly onto the steel frame. Bolt the cover through the front and rear end plates using QTY 3 – 3/8" bolt in each plate. Bolt the top outer corners using QTY 4 – 3/8" bolts total in the top of cover. Add additional bolts as required to support the middle of the cover. Torque 3/8" bolts to 35-40 ft-lbs., using lock washers where prevailing torque nuts are not used.

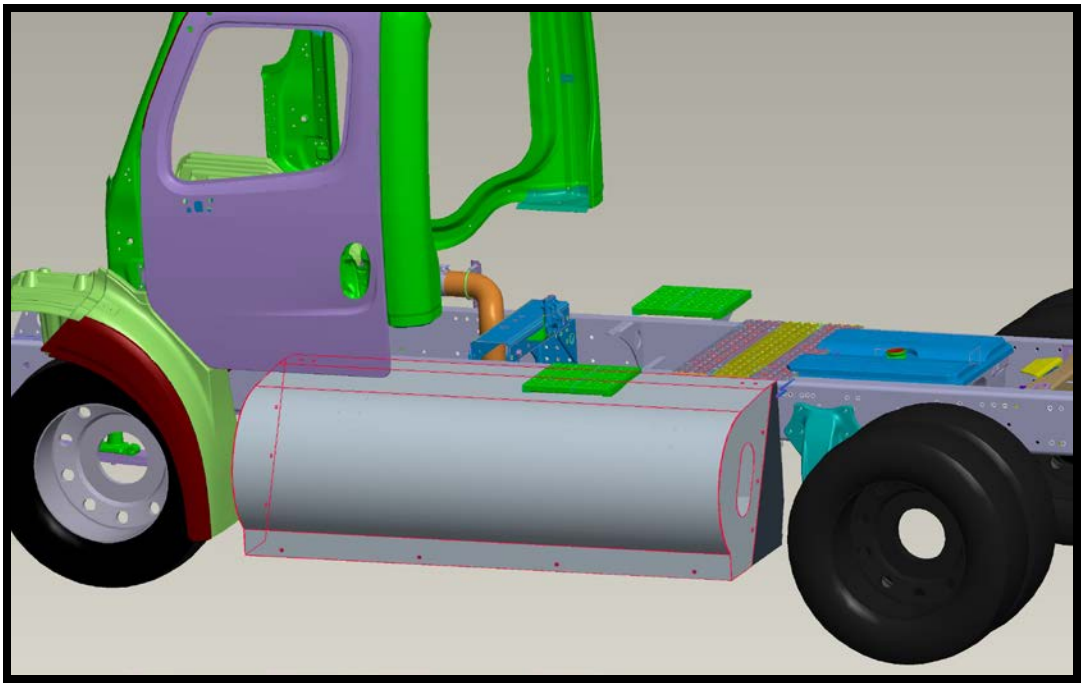


Figure 23: Cover Installation

If a 2nd tank is installed, follow the previous instructions. The figure below shows a 2nd tank installed on the right side of the chassis.

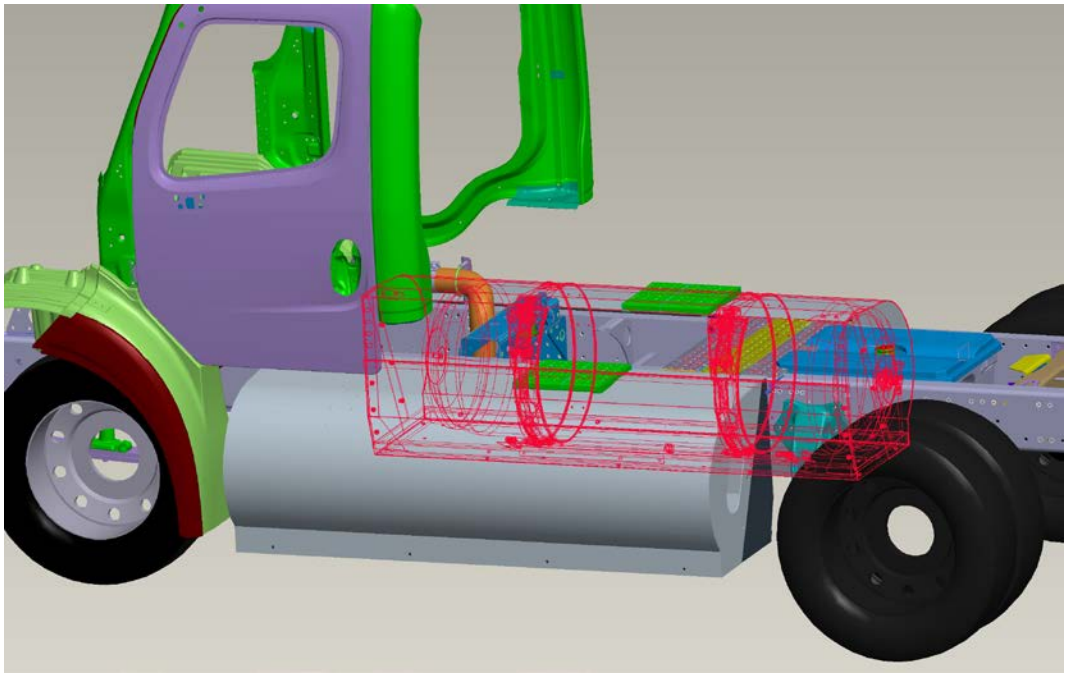


Figure 24: 2nd Tank Installation

Note that trucks with steps have the step brackets bolted to the outside of the covers. Bolts must be a low profile flat head or round head bolt, with the head on the inside of the cover, and nuts on the outside.
NO HEX HEAD BOLTS PERMITTED.

Refer to Figure 25 for an example of a side mount cover.

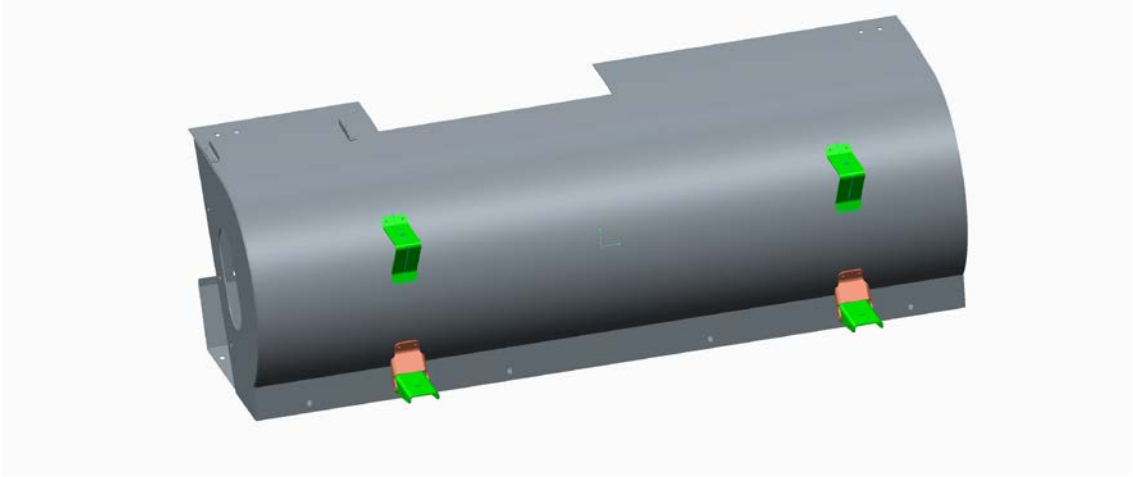


Figure 25: Side Mount Cover

5 QUALITY INSPECTION AND CHECKLIST

After Installation, perform a leak test. Inspect the fuel system using Quality Checklist. Once all requirements are reviewed, have a 2nd inspector review and sign off on the system. During first fill of the vehicle, verify that there are no leaks using a combustible gas detector.



NOTE: As a follow-up to the installation, the j-bracket strap nuts (initial torque 60 ft-lbs.) should be checked with a torque tester after the vehicle has gone through several filling cycles. It is recommended that after 1-3 months of service that these nuts are re-torqued to 60 ft-lbs.