

May 26, 2010



U.S. Department  
of Transportation

East Building, PHH-30  
1200 New Jersey Avenue S.E.  
Washington, D.C. 20590

**Pipeline and Hazardous  
Materials Safety Administration**

DOT-SP 14831

**EXPIRATION DATE: April 30, 2012**

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Gasitech Industries - Gas -  
Handelsgesellschaft mbH, Welsleben, Germany  
(U.S. Agent: Bureau Veritas North America, Inc.  
Houston, TX)
  
2. PURPOSE AND LIMITATION:
  - a. This special permit authorizes the use of certain DOT Specification 3A or 3AA cylinders for the transportation in commerce of the compressed gases listed in paragraph 6. The cylinders are retested by utilizing the ultrasonic examination (UE) of 100 percent of the sidewall in accordance with procedures described in paragraph 7 below in place of the internal visual inspection and the hydrostatic retest required in § 180.205. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.
  
  - b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce.
  
  - c. Party status will not be granted to this special permit.
  
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
  
4. REGULATIONS FROM WHICH EXEMPTED. 49 CFR §§ 180.205 and 173.302a in that the ultrasonic examination is performed in place of the hydrostatic pressure test and internal visual examination.

**NOTE:** This special permit does not relieve the holder from securing an approval for retesting cylinders from the Associate Administrator for Hazardous Materials Safety.

5. BASIS This special permit is based on the application of Gasitech Industries - Gas - Handelsgesellschaft mbH dated March 25, 2009 and additional technical information dated March 22, April 9, 15, 2010 submitted in accordance with § 107.105 and the public proceeding thereon.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

<b>Hazardous Materials Description</b>			
<b>Proper shipping name</b>	<b>Hazard Class/ Division</b>	<b>Identification Number</b>	<b>Packing Group</b>
The appropriate proper shipping name listed in § 172.101/ Liquefied or nonliquefied compressed gases, or mixtures of such compressed gases which are authorized in the Hazardous Materials Regulations for transportation in DOT 3A and 3AA cylinders.	2.1, 2.2 or 2.3 as applicable	As listed in § 172.101 for the specific compressed gas or gas mixture.	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a DOT Specification 3A or 3AA cylinder that is subjected to periodic retesting, reinspection and marking prescribed in § 180.205 except that the cylinder is examined by ultrasonic examination (UE) in lieu of the hydrostatic pressure test and internal visual examination prescribed in § 180.205. Each cylinder must be subjected to an external visual examination and retested in accordance with the procedure described in Gasitech's application for special permit on file with the Office of Hazardous Materials Special permit and Approvals (OHMSPA) unless otherwise noted herein. A cylinder that has been exposed to fire or to excessive heat may not be retested under the terms of this special permit.

b. Ultrasonic Equipment and Performance. The ultrasonic equipment performance must conform to the GASITECH application on file with OHMSPA and as prescribed in this special permit. The equipment will be a fully automated, pulse echo type, and incorporate multiple channel transducers, with interactive software. The ultrasonic system must be capable of entering shear waves into the cylinder wall in both longitudinal and circumferential directions and normal to the cylinder wall to ensure 100 percent coverage of the cylinder wall. The ultrasonic system must be capable of detecting all defects (such as isolated pits, line corrosion, sidewall defects and line corrosion inside-wall-to base transition area (SBT)) must be detected. The system must be set-up to perform longitudinal ultrasonic angle beams from the cylinder shoulder down to the cylinder base that includes sidewall-to-base transition (SBT) area and from the cylinder base up to the cylinder shoulder. The transducers or cylinder must be arranged so that the ultrasonic beams enter into the cylinder wall in directions necessary to detect calibration cylinder features (e.g. FBH) and thus detect side wall cylinder flaws. The ultrasonic testing system must be equipped to discern when the ultrasonic data indicates a loss of acoustic coupling between the transducer assembly and the cylinder wall. This safety control measure must be an integral part of the ultrasonic testing procedure. A test must be considered invalid if a Lack-of-Expected-Response (L.E.R.) incident is indicated. An L.E.R. indication of the wall thickness channel in the sidewall-to-base transition (SBT) area will not invalidate the test, as long as one of the longitudinal shear wave channels is transmitting the ultrasonic signals into the SBT area. A manual contact shear or longitudinal search units may be used for evaluating and sizing indicated defects. Manual UE must be performed under direct supervision of a Senior Review Technologist by a minimum Level II operator and in accordance with American Society of Testing Materials (ASTM) practice E 213.

c. Standard References (Calibration Standards).

(1) UE Reference Cylinder - A cylinder or cylinder section must be used as a standard reference and must have similar acoustic properties, surface finish and metallurgical condition as the cylinders under test. The standard reference, (reference cylinder) must have a known minimum design wall thickness ( $t_m$ ) which is less than or equal to the cylinder under test. The standard

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reference cylinder for cylinders less than or equal to 6-inches in diameter must have the same nominal diameter as the cylinder being tested.

Cylinders greater than 6-inches in diameter must conform to the allowable size ranges shown in the following table:

Standard Reference	Cylinder Size Ranges is being retested by UE	
	Minimum OD- inches	Maximum OD- Inches
7.00	6.30	10.50
7.50	6.75	11.25
9.00	8.10	13.50
9.25	8.33	13.88
10.00	9.00	15.00
12.00	10.80	18.00

Prior to placing the simulated defects, such as minimum wall thickness, the average minimum wall thickness for the standard reference must be determined by means of an independent method.

(2) The standard reference (reference cylinder) must be prepared to include the following artificial defects:

(i) Simulated defect for reduction in wall thickness (area corrosion). A simulated defect for area corrosion must be machined into the inside surface of the cylinder. A minimum of two different thickness steps must be machined into the inside cylinder wall. Dimensions must be as follows:

(A) For DOT 3A and 3AA, the simulated defect must be less than or equal to 0.7 square inches (in<sup>2</sup>) and less than or equal to 1/20 of the design minimum wall thickness ( $t_m$ ) deep. The remaining wall thickness is equal or greater than  $t_m$ .

(ii) Simulated defect for an isolated pit. A flat bottom hole (FBH) must be machined into the inside surface of the cylinder to simulate an isolated pit.

Dimensions must be as follows:

- (A) For DOT 3A and 3AA with diameter less than or equal to 4 inches the FBH must be 1/8-inch diameter and 1/3 of  $t_m$  depth.
- (B) For DOT 3A and 3AA with diameter greater than 4 inches the FBH must be 1/4-inch diameter and 1/3 of  $t_m$  depth.
- (C) For DOT 3A and 3AA with diameter greater than 24 inches (tonner) the FBH must be 1/2-inch diameter and 1/3 of  $t_m$  depth.

(iii) Simulated defect for line corrosion in the sidewall-to-base transition (SBT). A circumferential notch must be machined into the surface of the cylinder to simulate SBT line corrosion. The notch must be 0.10 of  $t_m$  depth, 1 inch long and less than or equal to 0.02 inch width for **standard reference (calibration cylinder)** produced after April 4, 2006. **Standard reference (calibration cylinder)** produced before April 4, 2006 may have larger length and width but must be stamped with date to indicate the evidence of their manufactured date.

- (3) A certification statement signed by a GASITECH senior review technologist (SRT) must be available for all standard references at each site where retesting is performed. The certification statement must include a standard reference drawing for each size and type of cylinder. A standard reference drawing must include dimensions and the locations of each simulated defect.

d. Ultrasonic Examination (UE) system Standardization (Calibration). Prior to retesting a cylinder, the cylinder class (DOT specification) must be identified. The UE system must be standardized for testing the identified cylinder by using a standard reference. The standard reference must be similar (material of construction, size, wall thickness, etc.) to the identified cylinders to be tested. Standardization of the UE system must be performed by using a relevant reference cylinder that is described in paragraph 7.c. of this special permit. The standardization of the UE system is as follows:

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(1) A reference cylinder with a machined simulated defect made to represent area corrosion must be placed in the UE system. The UE system must be standardized to indicate rejection for an area equal or greater than the machined surface for that class of cylinder (e.g. 0.70 in<sup>2</sup> for DOT 3A, 3AA). Where the wall thickness is reduced below  $t_m$ , a straight ultrasound beam must be used to measure the wall thickness of the machined area.

(2) A reference cylinder with a machined FBH made to represent an isolated pit must be placed in the UE system. The FBH must be detected by a minimum of two shear wave beams that strike the FBH from opposite sides (e.g. the first shear wave direction is from top to bottom of the cylinder and the second shear wave direction is from the bottom to top). The UE gain must be increased until the signal from FBH is maximized at 80 percent of the screen height.

(3) A reference cylinder with a machined notch made to represent SBT line corrosion must be placed in the UE system. The notch must be detected by a minimum of one shear wave beam. The UE gain must be increased until the signal from the notch is maximized at 80 percent of the screen height.

e. Test Procedures.

(1) During the test, each cylinder must be examined by the standardized (calibrated) UE system using a relevant set-up that is described in paragraph 7.d. of this special permit.

(2) For each cylinder tested, all 5 scan passes/channels must be performed as they are described in paragraph 7.d.

(3) For retesting of DOT-3A and 3AA specification cylinders, the UE system that is set-up to perform a 5 pass/channel scan may perform a 3 pass/channel scan if the longitudinal (descending from the cylinder shoulder down to SBT) and circumferential (clockwise) angle beam scans do not detect a reject able flaw.

(4) A copy of the operating test procedure (as approved and acknowledged in writing by OHMSPA) for performing ultrasonic examination of cylinders under the terms of this special permit must be at each facility performing ultrasonic examination. At a minimum, this procedure must include:

(i) A description of the test set-up; test parameters; transducer model number, frequency, and size; transducer assembly used; system standardization procedures and threshold gain used during the test; and other pertinent information.

(ii) Requirement for the equipment standardization to be performed at the end of the test interval (cal-out), after 200 cylinders or four hours, whichever occurs first. This cal-out can be considered the cal-in for the next interval during continuous operation. Cylinders examined during the interval between cal-in and cal-out must be quarantined until an acceptable cal-out has been performed. An acceptable cal-out occurs when the calibration cylinder is examined and all required features are revealed without changing examination settings. If an acceptable cal-out does not occur, if any equipment that affects the UE results are replaced or altered (such as a search unit or coaxial cable etc.), all cylinders examined since the last successful calibration must be re-examined. When a loss of power occurs a re-standardization must be performed when power is returned and before cylinder examination commences. If no adjustments are made to the examination settings then this recalibration may be considered a cal-out for the quarantined cylinders. However, if examination settings are changed then all cylinders examined since the last successful calibration must be re-examined. Additionally, standardization of test equipment shall be performed at the beginning of each work shift, when the cylinder under test has dimensions that exceed the allowable ranges of the reference cylinder, when there is a change of operator(s), if any equipment that affects the UE results are replaced or altered (such as a search unit or coaxial cable etc.) or when a loss of power occurs, and at the end of each work shift.

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(5) A copy of the most recent approved operating test procedure must be made available to a DOT representative when requested. Any change to the written procedures or in UE equipment (software or hardware), other than as supplied by the original equipment manufacturer, must be submitted to and approved by AAHMS prior to implementation.

(6) The equipment may not allow testing of a cylinder unless the system has been properly standardized (calibrated).

(7) The rotational speed of a reference cylinder must be such that all simulated defects are adequately detected, measured and recorded.

(8) The rotational speed of the cylinder under UE must not exceed the rotational speed used during the standardization.

(9) The pulse rate must be adjusted to ensure a minimum of 10% over-lapped for each helix.

(10) The area of ultrasonic examination (UE) coverage must be 100% of the cylindrical section. The coverage must extend at least three inches into the sidewall-to-base transition taper.

(11) The external surface of the cylinder to be examined must be free of loose material such as scale and dirt.

f. Acceptance/Rejection Criteria. A cylinder must be rejected based on any of the following:

(1) The measured wall thickness is less than the calculated design minimum wall thickness using a maximum allowable stress of 58,000 ksi for 3A cylinders and 73,000 ksi for 3AA cylinders for the area described in the standardization section herein, paragraph 7.d.

(2) If any of the flaws such as the isolated pit, or circumferential line which meet the rejection criteria and produce a signal with an amplitude which crosses the reference threshold set in the standardization section (paragraph 7.d.).

g. Rejected cylinders. When a cylinder is rejected, the retester must stamp a series of X's over the DOT specification number and marked service pressure, or stamp



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"CONDEMNED" on the shoulder, top head, or neck using a steel stamp, and must notify the cylinder owner, in writing, that the cylinder is rejected and may not be filled with hazardous material for transportation in commerce.

(1) Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure.

(2) If a condemned cylinder contains hazardous materials and the testing facility does not have the capability of safely removing the hazardous material, the retester must stamp the cylinder "CONDEMNED" and affix conspicuous labels on the cylinder(s) stating: "UE REJECTED DOT-SP 14831. RETURNING TO ORIGIN FOR PROPER DISPOSITION". The retester may only offer the condemned cylinders for transportation by a motor vehicle operated by a private carrier to a facility, identified to, and acknowledged in writing with OHMSPA, that is capable of safely removing the hazardous material. A current copy of this special permit must accompany each shipment of condemned cylinders transported for the disposal of hazardous material.

h. Marking. Each cylinder passing retests under the provisions of this special permit must be marked as prescribed in § 180.209. In addition, each cylinder must be marked UE, in characters not less than 1/4 high at a location close to the retester's marking.

i. UE Report. A report must be generated for each cylinder that is examined. The UE report must include the following:

- (1) UE equipment, model and serial number
- (2) Transducer specification, size, frequency and manufacturer
- (3) Specification of each standard reference used to perform UE. Standard reference must be identified by serial number or other stamped identification marking.
- (4) Cylinder serial number and type
- (5) UE technician's name and certification level
- (6) Examination Date
- (7) Location and type of each defect on the cylinder (e.g. longitudinal line corrosion 5 inches from base)
- (8) Dimensions (area, depth and remaining wall thickness) and brief description of each defect

- (9) Acceptance/rejection results
- (10) The UE report must be on file at each test facility, and copies made available to a DOT official when requested.

j. Personnel Qualification: Each person who performs retesting, and evaluates and certifies retest results must meet the following qualification requirements:

(1) Project Manager/Director of Product Technology - is the senior manager of CYMACO responsible for compliance with DOT regulations including this special permit. Additionally, the project manager must ensure that each operator and senior review technologist maintains the required certifications described herein.

(2) The personnel responsible for performing cylinder retesting under this special permit must be qualified to an appropriate Ultrasonic Testing Certification Level (Level I, II or III) in accordance with the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A or in accordance with personnel qualification described in ISO 6406 for UE or in accordance with personnel qualification of the German Transport Authority, BAM. The assigned responsibility are as following:

(i) System startup and calibration must be performed by a Level II operator. A Level II operator may review and certify test results. However, written procedures for accepting/rejecting a cylinder must be provided by the senior review technologist. Based upon written criteria, the Level II Operator may authorize cylinders that pass the retest to be marked in accordance with paragraph 7.h of this special permit. A person with Level I certification may perform a system startup, check calibration, and perform ultrasonic testing under the direct guidance and supervision of a Senior Review Technologist or a Level II Operator, either of whom must be physically present at the test site so as to be able to observe testing conducted under this special permit.

(ii) Senior Review Technologist (SRT) - is a person who provides written UE procedure, supervisory training, examinations (Level I and II) and technical guidance to operators, and reviews and verifies the retest results. A SRT must have a thorough understanding of the DOT Regulations (49 CFR) pertaining to the requalification and reuse of DOT cylinders that are authorized under both this special permit and ASNT Recommended Practice SNT-TC-1A or ISO 9712 and must possess either:

A. A Level III certification from ASNT in Ultrasonic Testing;

B. A Level III certification in Ultrasonic Testing that achieved in accordance with ISO 9712,

C. A Professional Engineer (PE) License with a documented experience for a minimum of 2 years experience in Non-Destructive Evaluation (NDE) of pressure vessels or pipelines using the ultrasonic examination technique; or

D. A PhD degree in a discipline of Engineering/Physics with documented evidence of experience in Non-Destructive Evaluation (NDE) of pressure vessels or pipelines using the ultrasonic examination technique or research/thesis work and authoring/co-authoring of technical papers published, in recognized technical journals, in the fields of ultrasonic testing methods.

The SRT must prepare and submit the reports required in paragraphs 7.i. and annually verify that the UE program is being operated in accordance with the requirements of this special permit.

The most recent copies of certification (e.g. ASNT Level III, P.E.) must be available for inspection at each requalification

8. SPECIAL PROVISIONS:

a. The ultrasonic examination data, results, and additional technical information deemed pertinent in successful application of the UE shall be reported to OHMSPA. The purpose of this information is to determine whether certain examination procedures and criteria require modification. For any rejected cylinder, the defect causing the rejection must be fully characterized and profiled. That is, the specific type of defect should be identified (i.e. isolated pits, line corrosion or SBT crack) and the specific size of the defect should be determined (i.e. length, depth, width, diameter, area, etc.). The cylinder type, size, minimum design wall thickness, age, etc. of the rejected cylinder must be reported. The ultrasonic signal profile should be reported for any defect causing the cylinder to be rejected. These results must be summarized and reported to OHMSPA on an annual basis. The special permit holder must submit to OHMSPA an evaluation of the effectiveness of the ultrasonic examination program authorized by this special permit as part of any request to renew the special permit submitted in accordance with § 107.109.

b. The total number of cylinders tested and rejected under this special permit must be reported to OHMSPA by cylinder class and age. These results must be summarized and reported on an annual basis.

c. Offerors may use the cylinders specified and tested in accordance with the provisions of this special permit for the transportation in commerce of those hazardous materials specified herein, provided no modifications or changes are made to the cylinders, and all terms of this special permit are complied with.

d. Shippers using the cylinders covered by this special permit must comply with the provisions of this special permit, and all other applicable requirements contained in 49 CFR Parts 100-185.

e. In order to authorize a cylinder for a special filling limit (+ marking) stated in section 173.302a(b) the cylinder must meet the following:

1. The cylinder must meet the requirement of 173.302a(b)(1).

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2. The wall thickness of the cylinder is equal to or greater than the design minimum wall thickness as it is described in the accept/reject criteria of this special permit for each cylinder type.
  - f. Transportation of Division 2.1 (flammable gases) and Division 2.3 (gases which are poisonous by inhalation) are not authorized aboard cargo vessel or aircraft unless specifically authorized in the Hazardous Materials Table (§ 172.101).
  - g. Transportation of oxygen is only authorized by aircraft when in accordance with § 175.501.
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only and passenger-carrying aircraft, as currently authorized by the regulations for the hazardous materials being transported.
10. MODAL REQUIREMENTS: None, other than as required by the HMR.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
  - o All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
  - o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
  - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

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Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)- 'The Hazardous Materials Safety and Security Reauthorization Act of 2005' (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:



for Dr. Magdy El-Sibaie  
Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Material Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at [http://hazmat.dot.gov/sp\\_app/special\\_permits/spec\\_perm\\_index.htm](http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm). Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

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