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Certificate of Registration

This is to certify that: Structural Composites Industries, 325 Enterprise Place, Pomona, California, pursuant to its application on file with Transport Canada has been granted the registration No. M77 in accordance with the provisions of Special Permit No. 3263 and Section 25 of CAN/CSA-B339-88 for the purpose of manufacturing compressed gas cylinders under the following limitations:

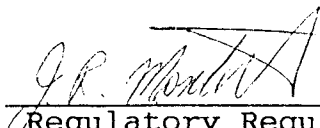
- 1) The cylinders shall be manufactured and maintained in complete accordance with the requirements set out in Appendices A or B to this certificate and the applicable sections of the "Regulations for the Transportation of Dangerous Commodities by Rail". All cylinders must also conform with the additional information provided with the application on file with this Directorate.
- 2) The manufacturing must be supervised by a duly authorized Independent Inspection Agency under an inspection procedure conforming to the requirements set out in Appendices A or B attached to this certificate and filed with this Directorate.
- 3) Within 2 years after the Registration date of this certificate, a quality assurance manual shall be submitted to the Director. The manual shall indicate that the operations of the plant are in accordance with CAN3-Z299.3-85 standard or equivalent.

Not later than 20 days after any changes occur in the information submitted in support of the application, the holder shall advise this Directorate of any such changes.

Failure to comply with the above mentioned requirements or any applicable regulations may result in the suspension or revocation of this Certificate of Registration.

This Certificate of Registration shall expire on April 30, 1995 or on such previous date as this Directorate may decide.

Registration date: 27 APR 1990

Signed: 
Director, Regulatory Requirements
Transport Dangerous Goods
Directorate



Canada

APPENDIX A TO CERTIFICATE OF REGISTRATION M77

The following requirements apply to cylinders made in accordance with Structural Composites Industries applications and models ALT 59, ALT 285, ALT 294, ALT 129, ALT 296, ALT 295, ALT 423, ALT 374, ALT 356 and corresponding drawings, and additional design and performance data on file with this Directorate.

The cylinders shall be of the fiber reinforced plastic (FRP) full composite type manufactured in full compliance with DOT FRP-1 Standard Revision 1 dated March 15, 1982 (178 AA) except as specifically modified hereunder:

i) 178.AA-3 inspection by whom and where:

Inspections and verifications shall be performed by an Independent Inspection Agency authorized in writing for such purposes by this Directorate or by a valid order issued by the Canadian Transport Commission.

ii) 178.AA-4 Duties of Inspector

(g) Furnish complete inspector's report (178.AA-16) to the maker of the cylinder, to Transport Canada and upon request, to the purchaser.

iii) 178.AA-5 Authorized Material and Identification of Material

(a) Aluminum liner must be 6351 or 6061 alloy and T6 temper or 6010 alloy conforming to SCI 82-267 T6 specifications as indicated in the application.

iv) 178.AA-9 Thermal Treatment

(a) The aluminum liner must be solution heat treated and aged as follows after all forming operations and prior to pressurizing or overwrapping.

1) 6351 and 6061 alloy liners must be solution heat treated and aged to the T6 temper.

2) 6010 alloy liners must be solution heat treated and aged as appropriate for the alloy indicated in the application.

v) 178.AA-15 Marking

(b) Required markings are as follows:

1) "TC SP 3263 - M77A - YYYY"
(Where Y = service pressure in psig.)

- 2) A serial number and an identifying symbol (letters); location of number to be just below or immediately following the TC mark; location of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, Regulatory Requirements.
- vi) 178.AA-18 Design Qualification Tests
- (a) General - except as authorized in 178.AA-10(a), qualification tests as prescribed in this paragraph shall have been performed on representative cylinders of each specific design prior to the initial shipment. All cylinders used for design qualification test must be fabricated on the same equipment and subjected to the same processes as used to produce cylinders intended for charging and shipment. All tests must be witnessed by an independent inspector. Test reports must be kept on file by the cylinder maker and made available to the independent inspector and Transport Canada upon request.
- (b) Qualification test results - A report of all tests for each design describing test setup, procedure and results must be submitted to Transport Canada. This report must include at least the following basic information on each cylinder tested:***

SPECIAL REQUIREMENTS

- a) The cylinders shall be monitored and used in accordance with applicable sections of the "Regulations for the Transportation of Dangerous Commodities by Rail" and filled only with the following gases:

<u>Commodity</u>	<u>Identification Number</u>
Air, compressed	1002
Oxygen, compressed	1072

- b) Cylinder service life must not exceed 15 years.
- c) Use of these cylinders for underwater breathing is not authorized.
- d) Cylinders used in oxygen service must be in compliance with section 73.302(a)(5)(i) through (a)(5)(iv).
- e) Cylinder must be packaged in accordance with 73.301(k).

- f) Each cylinder must be reinspected and hydrostatically retested at least once every three years in accordance with section 73.34(e) as prescribed for CTC 3HT cylinders, except that permanent volumetric expansion must not exceed five percent of total volumetric expansion at test pressure and retest dates must be imbedded in the epoxy coating.
- g) A cylinder which has been subjected to the action of fire must not be returned to service.
- h) The Director, Regulatory Requirements shall be advised of any change in design of the cylinder.
- i) The Director, Regulatory Requirements shall be advised of any incident involving loss of contents and shall be provided with a summary of experience on a yearly basis.

APPENDIX B TO CERTIFICATE OF REGISTRATION M77

The following requirements apply to cylinders made in accordance with Structural Composites Industries applications and models ALT 280, ALT 279, ALT 281, ALT 282, ALT 372, ALT 405 and corresponding drawings and additional design and performance data on file with this Directorate.

The cylinders shall be of fiber reinforced plastic (FRP) full composite type manufactured in full compliance with DOT FRP-1 Standard Revision 1 dated March 15, 1982 (178.AA) except as specifically modified hereunder:

i) 178.AA-3 Inspection by whom and where

Inspections and verifications shall be performed by an Independent Inspection Agency authorized in writing for such purposes by this Directorate or by a valid order issued by the Canadian Transport Commission.

ii) 178.AA-4 Duties of Inspector.

(g) Furnish complete inspector's report (178.AA-16) to the maker of the cylinder, to Transport Canada and upon request to the purchaser.

iii) 178.AA-5 Authorized Material and Identification of Material

(a) ***

(b) Filament material must be Kevlar 49 in compliance with proposed aerospace materials specifications (AMS) 3901. Filament must be tested in accordance with ASTM D 2343-67 for strand strength, and ASTM D 3317-74 for denier. The strength and denier must be as follows:

(1) Strand strength - 450,000 PSI minimum.

(2) Denier must be at least 90 percent of the nominal value specified in AMS 3901. Denier of roving maybe certified by the filament manufacturer.

iv) 178.AA-6 Manufacture

(a) Liner (Add to end of paragraph). Each cylinder liner must be of seamless construction with integrally formed heads and bottoms. Manufacture is by backward extruded shell with threaded end formed by spinning.

- v) 178.AA-10 Pressure relief devices and protection for valves, relief devices, and other connections.
- (a) Pressure relief devices and protection for valves and other connections must be in compliance with sections 73.34(d), and 73.301(g); except that the adequacy of the pressure relieving devices for each design must be verified in accordance with 178.AA-18(g) notwithstanding the requirement in CGA Pamphlet C-14.
- vi) 178.AA-15 Marking
- (b) Required markings are as follows:
- (1) "TC SP 3263-M77B-YYYY"
(Where Y = service pressure in psig)
- (2) A serial number and an identifying symbol (letters); location of number to be just below or immediately following the TC mark; location of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, Regulatory Requirements.
- vii) 178.AA-18 Design Qualification Tests
- (a) General - except as authorized in 178.AA-10(a), qualification tests as prescribed in this paragraph shall have been performed on representative cylinders of each specific design prior to the initial shipment. All cylinders used for design qualification and tests must be fabricated on the same equipment and subjected to the same processes as is used to produce cylinders intended for charging and shipment. All tests must be witnessed by an independent inspector. Test reports must be kept on file by the cylinder maker and made available to the independent inspector and Transport Canada upon request.
- (f) Gunfire test. One representative cylinder charged with air or nitrogen to service pressure shall be impacted by a 0.30 calibre armour piercing projectile having a velocity of approximately 2800 feet per second. Cylinders shall be so positioned that projectile impact point is in the bottom cylinder wall aimed to exit at cylinder sidewall, or impact point is on the cylinder sidewall at a 90°

angle to the cylinder sidewall axis. Distance from firing location to test cylinder not to exceed 50 yards. Tested cylinder shall reveal no evidence of fragmentation failure. Any tear beyond 3 inches from the entrance or exit hole is cause for rejection. Approximate size of entrance and exit openings must be recorded.

- (h) Qualification test results - a report of all tests for each design describing test setup, procedure and results must be submitted to Transport Canada. This report must include at least the following basic information on each cylinder tested:***

SPECIAL REQUIREMENTS

- (a) The cylinders shall be maintained and used in accordance with applicable sections of the "Regulations for the Transportation of Dangerous Commodities by Rail" and filled only with the following gases:

<u>Commodity</u>	<u>Identification Number</u>
Air, compressed	1002
Oxygen	1072

- (b) Cylinder service life must not exceed 15 years.
- (c) Use of these cylinders for underwater breathing is not authorized.
- (d) Cylinders used in oxygen service must be in compliance with section 73.302(a)(5)(i) through (a)(5)(iv).
- (e) Cylinder must be packaged in accordance with section 73.301(k).
- (f) Each cylinder must be reinspected and hydrostatically retested every three years in accordance with section 73.34(e) as prescribed for CTC 3HT cylinders, except that the rejection elastic expansion criteria does not apply, and permanent volumetric expansion must not exceed 5 percent of total volumetric expansion at test pressure. Retest dates must be applied on the epoxy coating in a permanent manner other than by stamping. Retest dates may be steel stamped on the outer exposed metallic surface of the cylinder neck as an alternate method. Reheat treatment or repair of rejected cylinders not authorized.
- (g) A cylinder which has been subjected to the action of fire must not be returned to service.

- (h) The Director, Regulatory Requirements shall be advised of any change in design of the cylinder.

- (i) The Director, Regulatory Requirements shall be advised of any incident involving loss of contents and shall be provided with a summary of experience on a yearly basis.