

**OFFICIAL MEXICAN STANDARD**  
**NOM-EM-020-SCT2/1995**  
**GENERAL REQUIREMENTS FOR THE DESIGN**  
**AND CONSTRUCTION OF CARGO TANK-TRUCKS INTENDED**  
**FOR THE TRANSPORT OF HAZARDOUS MATERIALS AND WASTES.**  
**SPECIFICATIONS SCT 306, SCT 307 AND SCT 312.**

**1. OBJECTIVE.**

The purpose of this Emerging Official Mexican Standard is to set forth the general requirements for the design and construction of cargo tank-trucks intended for the land transport of hazardous materials and wastes, namely, Specifications SCT 306, SCT 307 and SCT 312.

**2. APPLICABILITY.**

This Emerging Official Mexican Standard applies compulsorily to the manufacturers and remanufacturers of cargo tank-trucks, as well as the road carriers intending to transport hazardous substances, materials and wastes by land.

**3. REFERENCES.**

For the correct implementation of this Standard, the following Official Mexican Standards must be consulted:

NOM-002-SCT2/1994 LISTING OF THE MOST COMMONLY CARRIED HAZARDOUS SUBSTANCES AND MATERIALS.

NOM-004-SCT2/1994 SYSTEM FOR THE IDENTIFICATION OF UNITS INTENDED FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES.

NOM-006-SCT2/1994 BASIC ASPECTS FOR THE DAILY VISUAL INSPECTION OF THE UNIT INTENDED FOR THE ROAD TRANSPORT OF HAZARDOUS MATERIALS AND WASTES.

NOM-023-SCT2/1994 TECHNICAL INFORMATION WHICH MUST BE INCLUDED IN THE PLATE DISPLAYED BY THE CARGO TANK-TRUCKS, METAL INTERMEDIATE BULK CONTAINERS (IBCs) AND VESSELS WITH A CAPACITY GREATER THAN 500 LITERS, WHICH CARRY HAZARDOUS MATERIALS AND WASTES.

#### 4. DEFINITIONS.

**APPURTENANCE (ACCESORIO).**- Any tank attachment which is unrelated to the lading or containment function and which provides no structural support.

**HOSE COUPLING (ACOPLAMIENTO DE LA MANGUERA).**- This is a connection accessory for the loading and/or unloading function.

**CARGO TANK-TRUCK (AUTOTANQUE).**- A vehicular unit, of the tank type, which is subject to special specifications and which is intended for the transport of hazardous materials and wastes.

**MOTOR TANK-TRUCK (AUTOTANQUE DE MOTOR).**- Motor truck equipped with one or several tanks; said tanks may be permanently mounted permanently onto the truck, or they may be connected to and pulled by the truck, thus forming an integral part of the whole.

**LADING OR PRODUCT (CARGA O PRODUCTO).**- This means the hazardous material or waste contained in the tank.

**DESIGN CERTIFICATIONS (CERTIFICACIONES DE DISEÑO).**- Each type of cargo tank-truck design must be approved by an accredited Certification Organization, which certifies that the design complies with the specifications set forth in this Official Mexican Standard.

The manufacturer shall obtain from the Certification Organization the signed design approval, for each of its design types or models, certifying compliance with the standard. The drawings or sketches and the corresponding calculations, which used as basis for the certification, shall be and remain attached to the certificate.

The manufacturer shall keep the original of the design certificate in its office for a minimum of 10 years, or as long as said manufacturer maintains the model current and keeps producing it.

This Official Mexican Standard shall be complemented by the ASME Code requirements in those cases when it is so indicated in this Standard.

**S.C.T. DESIGN SPECIFICATIONS (ESPECIFICACIONES DE DISEÑO SCT).**- These set forth the characteristics which must be those of any tank constructed in Mexico in accordance with the Hazardous Product Classification of the United Nations Organization or in the Official Mexican Standards, for the transport of which hazardous product the tank is intended, each product bearing an S.C.T. number defining the type of material and all the characteristics of the tank, its appurtenances and operation system.

**MANUFACTURER (FABRICANTE).**- Any person, whether an individual or a legal entity, who designs, manufactures, remanufactures or repairs units of the tank or semitrailer type, which units are intended to carry hazardous materials and wastes.

**PRESSURIZATION LINES (LINEAS DE PRESURIZACION).**- A pipe, tube or device intended for the control of tank pressurization.

**BULKHEAD (MAMPARA).**- A divider which is used as a hermetic transverse separator for dividing the tank-truck into compartments.

**TANK WALL (PARED DEL TANQUE).**- This is the material which forms the shell of the container, which constitutes the leakproof cargo containment structure.

**TEST PRESSURE (PRESION DE PRUEBA).**- This is the pressure to which the tank must be subjected to determine its leakproofness no less than 1.5 times the design pressure.

**REAR-END PROTECTION (BUMPER) [PROTECCION PARA EL EXTREMO POSTERIOR (DEFENSA)].**- Structure designed to protect the rear part of the tank from impacts.

**OPENING OR DOME (REGISTRO O DOMO).**- A device intended for the control and filling of the tank.

**BAFFLE (ROMPEOLA).**- A cover with a manhole and a separate transverse flow, which regulates the surge and inertia of the product being transported.

**OUTLET (SALIDA).**- A tube, pipe or device intended for the control of tank discharge.

**TANK (TANQUE).**- This is the container used in highway transport for liquid, gas or bulk material contents (including appurtenances, reinforcements, fittings and closures).

It can be mounted in a permanent form, or it can be connected to and pulled by a motor truck.

It must be manufactured under specifications different from those for still or portable tanks or cylinders, rail tank-wagons or multimodal-service containers.

**DESIGN TYPE (TIPO DE DISEÑO).**- Within the SCT design, the following groups may be distinguished according to the like requirements and characteristics of the tanks:

When they are intended to transport the same product and have the same specifications.

When they were constructed by the same manufacturer.

When they were constructed based on the same calculations and engineering designs.

When they were constructed of the same materials.

When they have the same cross-sectional dimensions.

Tanks shall not lose their original design classification when they are subjected to the following changes:

A length variation of no more than 5% of the nominal length.

A volume variation of no more than 5% of the nominal volume.

For the purposes set forth in this Standard, with the same insulation system.

**DISCHARGE VALVE (VALVULA DE DESCARGA).**- A device which controls or stops the flow of product.

## 5. SPECIFICATIONS.

## 5.1 GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS

GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS APPLICABLE TO SPECIFICATIONS SCT 306, SCT 307 AND SCT 312 FOR CARGO TANK-TRUCKS.

### GENERAL REQUIREMENTS.

- (a) FOR THE TRANSPORT OF HAZARDOUS MATERIALS, ALL REQUIREMENTS INDICATED BELOW MUST BE COMPLIED WITH AS WELL AS THE OTHER MINIMUM REQUIRED SPECIFICATIONS WHICH APPLY BASED ON THE CLASS OF MATERIALS WITHIN THIS OR ANY OTHER STANDARD.
- (b) ALL REQUIREMENTS REGARDING PARTS AND ACCESSORIES MUST BE CONSISTENT WITH THE OFFICIAL MEXICAN STANDARDS.
- (c) MULTI-USE CARGO TANK-TRUCKS.
  - (1) A CARGO TANK-TRUCK MAY BE DIVIDED INTO COMPARTMENTS MANUFACTURED IN ACCORDANCE WITH A DIFFERENT SPECIFICATION. EACH SUCH COMPARTMENT MUST COMPLY WITH THE REQUIRED SPECIFICATIONS.
  - (2) A TANK MAY BE PHYSICALLY ALTERED OR MODIFIED SO AS TO COMPLY WITH ANOTHER ONE OF THIS STANDARD'S SPECIFICATIONS, OR IT MAY BE MODIFIED AS A UNIT FOR CARRYING ANY PRODUCT WHICH IS NOT CLASSIFIED AS HAZARDOUS MATERIAL.

### 5.1.1 **MATERIAL.**

- (a) ALL PLATE AND SHEET METAL MATERIAL FOR FABRICATING THE SHELL, HEADS, BULKHEADS AND BAFFLES FOR CARGO TANK-TRUCKS WHICH NEED NOT BE CONSTRUCTED IN ACCORDANCE WITH THE CODE FOR PRESSURE VESSELS AND BOILERS OR THE ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS) CODE MUST COMPLY, AS A MINIMUM, WITH THE FOLLOWING REQUIREMENTS:
  - (1) ALUMINUM (AL) ALLOYS. USE SHALL ONLY BE MADE OF ALUMINUM ALLOYS SUITABLE FOR FUSION WELDING AND CONFORMING WITH ANY OF THE FOLLOWING ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS) SPECIFICATIONS:

- ASTM B-209 ALLOY 5052
    - ASTM B-209 ALLOY 5086
    - ASTM B-209 ALLOY 5154
    - ASTM B-209 ALLOY 5254
    - ASTM B-209 ALLOY 5454
    - ASTM B-209 ALLOY 5652

FOR ALL HEADS, BULKHEADS AND BAFFLES, USE MAY BE MADE OF MATERIAL WITHOUT TEMPER OR TEMPERING. ALL TANK BODIES MUST BE MADE OF MATERIAL WITH PROPERTIES EQUIVALENT TO H32 OR H34 TEMPERS, EXCEPT THAT THOSE TEMPERS OF LESSER TENSILE STRENGTH MAY BE USED IF THE MINIMUM TANK SHELL THICKNESS [IS AS] INDICATED IN TABLES II FOR PARTS 5.2.1.2; 5.2.2.2 AND 5.2.3.2 (ANNEXES 2, 5 AND 8).

(2) STEEL WITH THE FOLLOWING SPECIFICATIONS:

	MILD STEEL (MS)	HIGH STRENGTH LOW ALLOY STEEL (HSLAS)	TIC SS	AUSTENI STAINLE STEEL (ASS)
	<u>Kg/cm?</u>	<u>Kg/cm?</u>		<u>Kg/cm?</u>
YIELD POINT - MAXIMUM STRESS - ELONGATION OF SAMPLES, IN PERCENTAGE	1,758 3,164.5  20	3,164.5 4,219.4  25		1,758 4,922.6  30

**5.1.2 STRUCTURAL INTEGRITY.**

- (a) STRESS VALUES. THE ULIMATE TENSILE STRENGTH SHALL NOT EXCEED 20 PERCENT OF THE MAXIMUM STRESS. EXCEPT WHEN SO INDICATED BY THE ASI DESIGN REQUIREMENTS FOR PRESSURE VESSELS.
- (b) LOADINGS. THE CARGO TANK-TRUCKS MUST BE PROVIDED WITH THE STRUCTURAL ELEMENTS NECESSARY TO WITHSTAND THE RESULTANT STRESSES WHICH EXCEED THOSE ALLOWED IN THE ABOVE PARAGRAPH (a) OF THIS SUB-SECTION[.] THE RESULTANT FORCES FOR EACH OF THE LOADINGS MUST BE CONSIDERED INDIVIDUALLY AND, WHERE APPLICABLE, THE VECTORIAL SUM OF ANY COMBINATION OF THE FOLLOWING STRESSES SHALL BE CONSIDERED:
  - (1) DYNAMIC LOADING UNDER ALL THE PRODUCT LOADING CONFIGURATIONS.
  - (2) INTERNAL PRESSURE.
  - (3) THE WEIGHT OF ACCESSORIES SUCH AS OPERATING EQUIPMENT, INSULATION, COVERINGS, CONDUIT CLIP, CABINETS AND PIPING.
  - (4) REACTIONS IN THE TIE PLATES SUPPORTING THE STRUCTURE OR OTHER FIXTURES.
  - (5) EFFECT OF VARIATIONS IN DUE TO A CHANGE IN TEMPERATURE RESULT IN THE EXPANSION OR CONTRACTION OF THE PRODUCT TO BE TRANSPORTED, CONSIDERED AS THERMAL COEFFICIENTS.

**5.1.3 JOINTS.**

- (a) JOINING METHOD. ALL JOINTS BETWEEN THE PLATES OF THE TANK SHELL, HEADS, BULKHEADS OR REINFORCEMENT RINGS, MUST BE WELDED IN CONFORMANCE WITH THE REQUIREMENTS INDICATED BELOW.
- (b) STRENGTH OF JOINTS (ALUMINUM +AL, ALLOY). ALL ALUMINUM ALLOY WELDS SHALL BE MADE IN ACCORDANCE WITH HE RECOMMENDED PRACTICES, AND THE EFFICIENCY OF A JOINT SHALL NOT BE LESS THAN 85 PERCENT OF THE PROPERTIES OF THE ADJACENT MATERIAL. ALUMINUM ALLOYS MUST BE JOINED BY AN ARC WELDING PROCESS INVOLVING INERT GAS AND USING A TYPE OF ALUMINUM-MAGNESIUM SOLDERING MATERIAL WHICH COMPLIES WITH THE MANUFACTURER'S RECOMMENDATIONS.
- (c) STRENGTH OF JOINTS (MILD STEEL) (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA). AUSTENITIC STAINLESS STEEL (ASS). THE JOINTS SHALL BE WELDED

IN ACCORDANCE WITH THE RECOMMENDED PRACTICES AND THE EFFICIENCY OF ANY JOINT SHALL NOT BE LESS THAN 85 PERCENT OF THE MECHANICAL PROPERTIES OF THE ADJACENT MATERIAL IN THE TANK.

- (1) COMBINATIONS OF MILD STEEL (MS). HIGH STRENGTH LOW ALLOY STEEL (HSLAS) AND/OR AUSTENITIC STAINLESS STEEL (ASS). IT MAY BE USED IN THE CONSTRUCTION OF ONE AND THE SAME TANK, TAKING INTO CONSIDERATION THAT EACH MATERIAL, WHERE USED, SHALL COMPLY WITH THE MINIMUM REQUIREMENTS SPECIFIED [IN] 5.1.1 (a) FOR THE MATERIAL USED IN THE CONSTRUCTION OF THIS TANK SECTION, WHENEVER SHEETS OF STAINLESS STEEL ARE USED IN COMBINATION WITH SHEETS OF OTHER TYPES OF STEEL, THE JOINTS MADE BY WELDING SHALL BE FORMED BY THE USE OF ELECTRODES OR BY STAINLESS STEEL SOLDERING MATERIAL IN ACCORDANCE WITH THE ADJACENT STAINLESS STEEL MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE STAINLESS STEEL ELECTRODES OR SOLDERING BARS.
- (d) JOINING METHOD. IN ACCORDANCE WITH THE REQUIREMENTS INCLUDED IN PARAGRAPH (b) OR (c) OF SECTION 5.1.3 FOR THE WELDED JOINTS INDICATED IN PARAGRAPH (a), SAID JOINTS SHALL BE DETERMINED BY PREPARING TEST BARS OF THE MATERIALS WHICH WILL BE USED IN THE TANK UNDER THIS SPECIFICATION AND BY THE SAME MANUFACTURING TECHNIQUE, 2 TEST BARS IN ACCORDANCE WITH THE FIGURE SHOWN BELOW, AND THEY MUST BE SUBJECTED TO TENSILE TESTS, THESE TEST SPECIMENS MUST ALSO BE TAKEN FOR ALL THE TANKS WHICH WILL BE MANUFACTURED UNDER THE SAME COMBINATION OF MATERIALS AS WELL AS BY THE SAME MANUFACTURING TECHNIQUE AND IN THE SAME WORKSHOP/FACILITY FOR A PERIOD OF SIX MONTHS AFTER THE TESTS ON SAID SPECIMENS HAVE BEEN MADE. TESTS OF THE BUTT WELD SPECIMENS SHALL BE CONSIDERED FOR ASSESSING OTHER TYPES OR COMBINATIONS OF TYPES OF WELDS USING THE SAME SOLDERING MATERIAL AND THE SAME WELDING PROCESS, SO LONG AS THE ORIGINAL METALS ARE OF THE SAME TYPE OF MATERIAL.

#### 5.1.4 SUPPORTS AND ANCHORING.

- (a) CARGO TANK-TRUCKS WITH FRAMES WHICH ARE NOT INTEGRATED TO EACH OTHER BY WELDING SHALL BE FITTED WITH ATTACHMENTS FOR SECURING THE TANK ONTO THE FRAME AND ELIMINATING ANY MOVEMENT RESULTING FROM BRAKING, STARTING OR TURNING THE TRUCK. SAID ATTACHMENTS MUST BE EASILY ACCESSIBLE FOR THEIR INSPECTION AND MAINTENANCE.
- (b) ANY CARGO TANK-TRUCK OF THE SEMITRAILER TYPE, DESIGNED AND CONSTRUCTED TO CONSTITUTE ITS WHOLE OR PARTIAL PRINCIPAL STRUCTURE, SHALL BE AFFIXED TO THE LOADING, SUSPENSION AND COUPLING BOLT

ELEMENTS, THE RESULT OF THE STRESS RATIOS IN THE CARGO TANK -TRUCK SHALL NOT EXCEED THOSE SPECIFIED IN SECTION 5.1.2 (a). THE DESIGN CALCULATIONS FOR ELEMENTS SERVING AS SUPPORT MUST INCLUDE ADDITIONAL DYNAMIC LOADINGS.

#### 5.1.5 CIRCUMFERENTIAL REINFORCEMENT.

- (a) TANKS WITH SHELL THICKNESSES LESS THAN 9.5 mm (3/8 INCH) MUST BE CIRCUMFERENTIALLY REINFORCED, IN ADDITION TO THE TANK HEADS, WHETHER WITH BAFFLES, BULKHEADS OR RINGS. USE SHALL BE ALLOWED OF ANY COMBINATION OF THE ABOVE-MENTIONED ELEMENTS IN A SOLE CARGO TANK-TRUCK.

- (1) LOCATION. SAID ELEMENTS SHALL BE LOCATED IN SUCH A WAY THAT THE MAXIMUM DISTANCE WITHOUT SHELL REINFORCEMENT [BE] AS SPECIFIED IN TABLE (II). ADDITIONALLY, SAID CIRCUMFERENTIAL REINFORCEMENT MUST BE LOCATED AT NO MORE THAN 2.5 CENTIMETERS (ONE INCH) FROM THE POINTS WHERE THE SHELL LONGITUDINAL ALIGNMENT DISCONTINUITY EXCEEDS 10 DEGREES, UNLESS SAID SHELL IS REINFORCED IN ANOTHER MANNER WITH STRUCTURAL ELEMENTS CAPABLE OF MAINTAINING THE LEVELS OF STRESS FOR THE COVERING AS ALLOWED IN SECTION 5.1.2 (a).
- (b) BAFFLES, BULKHEADS OR RINGS, COUPLING OF THE SAME IF THEY ARE USED AS REINFORCEMENT ELEMENTS, MUST BE CIRCUMFERENTIALLY WELDED TO THE TANK SHELL. THE WELDING MUST NOT BE LESS THAN 50 PERCENT OF THE TOTAL CIRCUMFERENCE OF THE CONTAINER AND THE MAXIMUM SPACE WITHOUT WELDING ON THIS JOINT SHALL NOT EXCEED THE LIMITS OF 40 TIMES THE THICKNESS OF THE SHELL PLATE.
- (c) DOUBLE BULKHEAD. TANKS DESIGNED FOR CARRYING DIFFERENT MATERIALS WHICH, IF COMBINED DURING TRANSIT, CREATE A HAZARD OR A GAS OR HEAT EMISSION MUST BE PROVIDED WITH COMPARTMENTS SEPARATED BY AN AIR SPACE. THIS AIR SPACER SHALL BE VENTILATED AND SHALL BE FITTED WITH DRAINAGE, WHICH SHALL BE KEPT OPERABLE AND VISIBLE AT ALL TIMES.
- (d) REINFORCEMENT RINGS. REINFORCEMENT RINGS, WHEN USED TO FULFILL THE REQUIREMENTS OF THIS SECTION, MUST BE CONTINUOUS AROUND THE CIRCUMFERENCE OF THE TANK SHELL, AND THEY MUST HAVE A MODULAR SECTION CLOSE TO THE NEUTRAL AXIS OF THE RING SECTION PARALLEL TO THE SHELL AT LEAST EQUAL TO THE RESULT OBTAINED BY USING THE FOLLOWING FORMULA:

$$\frac{I}{C} (\text{Min}) = 0.00027 \text{ WL (STEEL, INCLUDING HIGH STRENGTH CARBON AND STAINLESS STEEL)}$$

$$\frac{I}{C} (\text{min}) = 0.000467 \text{ WL (ALUMINUM ALLOY)}$$

where:

$$\frac{I}{C} = \text{SECTION MODULUS (cm?)}$$

W = TANK WIDTH OR DIAMETER (CM)

L = SPACING OF RINGS IN CM, E.G.: THE MAXIMUM DISTANCE FROM THE MIDDLE POINT OF ONE RING TO THE MIDDLE POINT OF THE OTHER.

- (1) IF THE RING IS WELDED TO THE TANK SHELL (WITH EACH CIRCUMFERENTIAL WELD NO LESS THAN 50 PERCENT OF THE TOTAL CIRCUMFERENCE OF THE CONTAINER AND THE MAXIMUM UNWELDED SPACE ON THIS JOINT NOT EXCEEDING 40 TIMES THE THICKNESS OF THE SHELL PLATE), A PORTION MAY BE CONSIDERED AS PART OF THE RING SECTION FOR PURPOSES OF DETERMINING THE MODULAR SECTION OF THE RING. THE MAXIMUM SHELL PORTION WHICH SHALL BE USED IN THESE CALCULATIONS IS THE FOLLOWING:

REINFORCEMENT RING CIRCUMFERENTIAL TO WELDS OF THE TANK SHELL	DISTANCE BETWEEN THE REINFORCEMENTS OF CIRCUMFERENTIAL RINGS PARALLEL TO ONE ANOTHER	VALUES SHELL SECTION
1	---	20 t.
2	LESS THAN 20 t	20 t + W.
3	20 t OR MORE	40 t.

WHERE:

t - THICKNESS OF SHELL PLATE.

W - DISTANCE BETWEEN THE PARALLEL CIRCUMFERENTIAL REINFORCEMENT RINGS WELDED TO THE SHELL.

- (2) IF THE CONFIGURATION OF THE INTERNAL OR EXTERNAL REINFORCEMENT RING ENCLOSES AN AIR SPACE, THIS AIR SPACE MUST HAVE VENTING AND BE FITTED WITH A DRAIN, WHICH TWO REQUIREMENTS MUST BE OBSERVED AT ALL TIMES.

**5.1.6 ACCIDENT DAMAGE PROTECTION.**

- (a) ATTACHMENTS: THE TERM "ATTACHMENT" MEANS ANY ACCESSORY WHICH, WHILE BEING ATTACHED TO THE CARGO TANK-TRUCK, HAS NO LIQUID PRODUCT RETENTION OR CONTAINMENT FUNCTION AND PROVIDES NO STRUCTURAL SUPPORT TO THE TANK.
- (1) THE DESIGN, CONSTRUCTION AND INSTALLATION OF ANY ATTACHMENT TO THE BODY OR HEAD OF THE CARGO TANK-TRUCK MUST BE SUCH AS TO MINIMIZE THE POSSIBILITY OF DAMAGE TO THE ATTACHMENT OR ITS FAILURE, WHICH WOULD ADVERSELY AFFECT THE PRODUCT RETENTION INTEGRITY OF THE TANK.
- (2) STRUCTURAL ELEMENTS, SUCH AS THE SUSPENSION FRAMES, ROLLOVER PROTECTION AND EXTERNAL RINGS SHALL BE USED, WHENEVER POSSIBLE, AS PARTS FOR SECURING ACCESSORIES AND ANY OTHER ATTACHMENTS ONTO THE CARGO TANK-TRUCK.
- (3) EXCEPT AS PRESCRIBED IN SUBPARAGRAPH (5) OF THIS PARAGRAPH, WELDING OF ANY ATTACHMENT TO THE SHELL OR HEAD MUST BE MADE TO A MOUNTING PAD. THE THICKNESS OF THE MOUNTING PAD SHALL NOT BE LESS THAN THE JACKET OF THE SHELL OR HEAD TO WHICH IT IS COUPLED. A PAD MUST EXTEND AT LEAST 5 CENTIMETERS IN EACH DIRECTION FROM ANY POINT OF ATTACHMENT OF AN APPURTENANCE. THE PADS MUST HAVE ROUNDED CORNERS, BE SHAPED IN A MANNER TO AVOID STRESS CONCENTRATIONS ON THE SHELL OR HEAD. THE MOUNTING PAD MUST HAVE A CONTINUOUS WELD ALL AROUND ITS PERIMETER.
- (4) THE ATTACHMENT MUST BE SECURED TO THE MOUNTING PAD TO ENSURE THAT THERE ARE NO ADVERSE EFFECTS ON THE PRODUCT RETENTION INTEGRITY OF THE TANK IN THE EVENT THAT ANY FORCE IS APPLIED IN ANY DIRECTION TO THE ATTACHMENT, EXCEPT THE NORMAL OF THE TANK, OR WITHIN A 45 DEGREE LIMIT OF SAID NORMAL.
- (5) SKIRTING STRUCTURES, ELECTRIC CONDUIT CLIPPING DEVICES, BRAKELINE CLIPPING DEVICES AND SIMILAR LIGHTWEIGHT ATTACHMENTS, WITH A THICKNESS OR MATERIAL STRENGTH WHICH IS APPRECIABLY LESS BUT NO GREATER THAN 72 PERCENT OF THE SHELL OR HEAD THICKNESS OF THE TANK



TO WHICH SAID DEVICE IS SECURED; IT CAN BE DIRECTLY SECURED ONTO THE SHELL OR HEAD OF THE TANK.

THIS DEVICE MUST NOT AFFECT THE PRODUCT RETENTION INTEGRITY OF THE TANK. THESE LIGHTWEIGHT DEVICES MUST BE SECURED TO THE TANK SHELL BY CONTINUOUS WELDING OR IN SUCH A MANNER AS TO PRECLUDE FORMATION OF POCKETS, WHICH COULD BECOME SITES OF INCIPIENT CORROSION.

- (b) REAR-END PROTECTION. EACH CARGO TANK-TRUCK MUST BE PROVIDED WITH A REAR-END PROTECTION TO PROTECT THE TANK AND PIPING IN THE EVENT OF A REAR-END COLLISION, AND TO MINIMIZE THE LIKELIHOOD OF THE TANK BEING STRUCK. THE PROTECTION MUST BE LOCATED AT LEAST 15.2 CENTIMETERS (6 INCHES) FROM ANY TRUCK COMPONENT USED FOR LOADING AND UNLOADING PURPOSES OR WHICH MAY CONTAIN LADING AT ANY TIME DURING TRANSIT. STRUCTURALLY, THE PROTECTION SHALL BE DESIGNED TO EFFICIENTLY ABSORB (NO DAMAGE WHICH COULD RESULT IN LOSS OF LADING) THE IMPACT OF THE TRUCK WITH NORMAL LOADING, WITH A DECELERATION OF 2 "g" USING A SAFETY OF 2 BASED ON THE TENSILE STRENGTH OF THE PROTECTIVE MATERIAL. FOR PURPOSES OF THIS STANDARD, SAID IMPACT SHALL BE CONSIDERED UNIFORMLY DISTRIBUTED AND APPLIED HORIZONTALLY (PARALLEL TO THE FLOOR) IN ANY DIRECTION WITHIN AN ANGLE OF NO MORE THAN 30° TO THE LONGITUDINAL AXIS OF THE TRUCK.
- (c) ROLLOVER PROTECTION. ALL FILLING, MANHOLE OR DOME ENTRANCES, AND INSPECTION OPENINGS, MUST BE PROTECTED FROM THE DAMAGE WHICH COULD RESULT FROM ANY PRODUCT LEAKAGE SHOULD THE TRUCK ROLL OVER. THESE PROTECTION ARE STRUCTURES WHICH ARE INSTALLED ON THE TOP PART OF THE TANK.
- (1) WHEN PROTECTIVE DEVICES ARE REQUIRED. THESE MUST BE DESIGNED AND INSTALLED SO AS TO WITHSTAND A VERTICAL LOAD OF TWICE THE WEIGHT OF THE LOADED TANK AND A HORIZONTAL LOAD IN ANY DIRECTION, EQUIVALENT TO HALF THE WEIGHT OF THE LOADED TANK. THESE DESIGN LOADS MAY BE CONSIDERED INDEPENDENTLY. THE TENSILE STRESSES OF THE MATERIAL MUST BE USED AS CALCULATION BASIS IF MORE THAN ONE PROTECTION IS USED, [AND] EACH SHELL SHALL CARRY ITS PROPORTIONAL PART OF THE LOAD.
- IF OTHER PROTECTION ARE REQUIRED, THE SAME CRITERION SHALL BE CONSIDERED FOR THE DESIGN LOADS TO BE APPLIED.
- (2) EXCEPT FOR PRESSURE-ACTUATED VALVES, THERE IS NO REQUIREMENT FOR ROLLOVER PROTECTION OR FOR NONOPERATING NOZZLES OR FOR ATTACHMENTS WITH A DIAMETER OF LESS THAN 13 CENTIMETERS (WHICH DO NOT CONTAIN LADING DURING TRANSIT) WHICH EXTEND FOR A DISTANCE LESS THAN THE INNER DIAMETER OF THE ATTACHMENT. THIS EXTENDED DISTANCE MAY BE MEASURED WHETHER FROM THE COVERING OR THE TOP PART OF AN ADJACENT REINFORCEMENT RING, PROVIDED THAT SAID REINFORCEMENT BE WITHIN 76 CENTIMETERS (30 INCHES) FROM THE CENTER OF THE NOZZLE OR ATTACHMENT.
- (3) IF THE ROLLOVER PROTECTION IS CONSTRUCTED SO AS TO ALLOW THE ACCUMULATION OF LIQUID ON THE TOP PART OF THE TANK, SAID PROTECTION MUST BE PROVIDED WITH DIRECT DRAINING DEVICES TO A SAFE POINT OF DISCHARGE.
- (d) PIPING
- (1) THE LADING DISCHARGE PIPING MUST BE PROVIDED WITH A PROTECTION IN SUCH A MANNER AS TO REASONABLY ASSURE AGAINST THE ACCIDENTAL LOSS OF CONTENTS. SAID PROTECTION MUST BE PROVIDED WITH:

- (i) A MACHINED SECTION, WHICH SHALL BE ACCOMPLISHED IN THE OUTSIDE RING OF THE RELIEF VALVE SEAT AT A DISTANCE OF APPROXIMATELY 100 CENTIMETERS FROM THE TANK SHELL, WHICH SHALL BREAK UNDER THE IMPACT OF THE FORCE AND SHALL FREE THE INTACT VALVE SEAT AND ITS CONNECTION TO THE TANK AS WELL AS THE VALVE HEAD, FOR THE PURPOSE OF RETAINING THE LADING. THE MACHINED SECTION SHALL BE SUCH AS TO ABRUPTLY REDUCE THE THICKNESS OF THE WALL OF THE PIPING OR VALVE MATERIAL BY AT LEAST 20 PERCENT; OR
  - (ii) BY ADEQUATE PROTECTION DEVICES CAPABLE OF SUCCESSFULLY ABSORBING A CONCENTRATED HORIZONTAL FORCE OF AT LEAST 3,600 KILOS APPLIED IN ANY HORIZONTAL DIRECTION WITHOUT DAMAGE TO THE DISCHARGE PIPING WHICH WOULD ADVERSELY AFFECT THE LADING RETENTION INTEGRITY OF THE DISCHARGE VALVE.
- (2) MINIMUM ROAD CLEARANCE. THE MINIMUM ROAD CLEARANCE OF ANY CARGO TANK-TRUCK COMPONENT OR PROTECTION MECHANISM LOCATED BETWEEN ANY OF THE TWO ADJACENT AXLES IN A TRUCK OR COMBINATION OF TRUCKS SHALL BE AT LEAST 1.3 CENTIMETERS FOR EACH 30 CENTIMETERS OF SEPARATION BETWEEN SAID AXLES AND IN NO CASE LESS THAN 30 CENTIMETERS.
  - (3) THE STRENGTH OF THE PIPING, CONNECTIONS, ATTACHMENTS, HOSES AND HOSE COUPLINGS FOR TANKS WHICH ARE UNLOADED BY PRESSURE MUST BE DESIGNED FOR A BURSTING PRESSURE OF AT LEAST 7.0 KG/CM<sup>2</sup> (10 psi) AND NO LESS THAN FOUR TIMES THE PRESSURE [TO] WHICH IT COULD, IN ANY CASE, BE SUBJECTED IN SERVICE BY THE ACTION OF ANY PUMP INSTALLED IN THE TRUCK OR ANY OTHER MECHANISM (NOT INCLUDING PRESSURE RELIEF VALVES), THE ACTION AT WHICH SOME PORTIONS OF THE TANK PIPING AND HOSE CAN BE SUBJECTED FOR PRESSURES GREATER THAN THE DESIGN PRESSURE OF THE TANK. ANY COUPLING USED ON THE HOSE FOR CONNECTION PURPOSES SHALL BE DESIGNED FOR A WORKING PRESSURE OF NO LESS THAN 20 PERCENT IN EXCESS OF THE DESIGN PRESSURE OF THE HOSE, AND IT MUST BE DESIGNED IN SUCH A WAY THAT NO LEAKAGE OCCURS WHEN IT IS CONNECTED.
  - (4) STIPULATIONS FOR EXPANSION AND VIBRATION. SUITABLE STIPULATIONS SHALL BE MADE IN EACH CASE TO TAKE INTO ACCOUNT AND PREVENT DAMAGE DUE TO THE EXPANSION, CONTRACTION, SHAKING AND VIBRATING OF THE WHOLE PIPING. HOSE SLIP JOINTS SHALL NOT BE USED FOR THIS PURPOSE.
  - (5) HEATING COILS. THE HEATING COILS, WHEN INSTALLED, MUST BE CONSTRUCTED IN SUCH A MANNER THAT BREAKING OF THEIR EXTERNAL CONNECTIONS DOES NOT RESULT IN ANY LOSS OF TANK LADING.
  - (6) GAGING DEVICES, LOADING AND AIR INLET ATTACHMENTS, INCLUDING THEIR VALVES, SHALL BE PROVIDED WITH ADEQUATE MEANS FOR THEIR SAFE CLOSING, AND SHALL ALSO BE PROVIDED WITH THE MEANS FOR THE CLOSURES OF THE PIPING CONNECTIONS OF THE VALVES.

#### 5.1.7 PUMPS.

- (a) THE LOADING OR UNLOADING PUMPS MOUNTED ON THE TRACTOR OR TRAILER, IF USED, SHALL BE PROVIDED WITH AUTOMATIC MEANS TO PREVENT THE PRESSURE FROM EXCEEDING THE DESIGN PRESSURE OF THE TANK AND EQUIPMENT MOUNTED THEREIN.

5.1.8 CERTIFICATION.

- (a) THE CERTIFICATION CONTAINING THE REQUIREMENTS OF PARAGRAPHS (b) AND (c) OF THIS SUBSECTION MUST INDICATE THAT SAID TANK HAS BEEN DESIGNED, CONSTRUCTED AND TESTED IN ACCORDANCE WITH THE RELEVANT SPECIFICATIONS FOR MODELS SCT 306, SCT 307, AND SCT 312. (5.2.1, 5.2.2, 5.2.3.)
  - (1) MULTI-USE TANKS. IF A CARGO TANK-TRUCK IS DIVIDED INTO COMPARTMENTS AND EACH COMPARTMENT IS CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF A DIFFERENT SCT SPECIFICATION, USE SHALL BE REQUIRED OF A METAL PLATE DESCRIBED IN PARAGRAPH (b) OF THIS SECTION, LOCATED ON THE RIGHT SIDE NEAR THE FRONT OF EACH COMPARTMENT, IN AN ACCESSIBLE LOCATION TO PERMIT ITS READING FOR INSPECTION PURPOSES. THE RELEVANT DETAILS OF THE MULTI-USE CONFIGURATION MUST ALSO BE CLEARLY INDICATED IN THE MANUFACTURER'S CERTIFICATE IN ACCORDANCE WITH PARAGRAPH (c) OF THIS SECTION.
    - (i) IF A TANK IS CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF A SPECIFICATION AND CAN PHYSICALLY BE MODIFIED TO COMPLY WITH ANOTHER SPECIFICATION FOR THIS PART OF THE TANK, OR CAN PHYSICALLY BE MODIFIED TO ACCOMMODATE A PRODUCT WHICH DOES NOT REQUIRE A SPECIAL OR SPECIFIC TANK, SAID MODIFICATIONS MUST BE CLEARLY INDICATED IN THE MANUFACTURER'S CERTIFICATE IN ACCORDANCE WITH PARAGRAPH (c) OF THIS SECTION AND THE PLATE DISPLAYED IN THE MULTI-USE TANK AS REQUIRED IN PARAGRAPH (b) (2) OF THIS SECTION.
  - (2) LACK OF SPECIFICATIONS. IF A CARGO TANK-TRUCK IS MANUFACTURED AND DOES NOT COMPLY WITH ALL THE REQUIREMENTS APPLICABLE TO A SPECIFICATION, IT SHALL REQUIRE SUBSEQUENT MANUFACTURING OPERATIONS WHICH INVOLVE THE INSTALLATION OF ADDITIONAL COMPONENTS, PARTS OR ACCESSORIES, IN WHICH CASE THE ORIGINAL MANUFACTURER SHALL BE ALLOWED TO DISPLAY THE CERTIFICATION PLATE REQUIRED IN PARAGRAPH (b) OF THIS SECTION. THE REQUIREMENTS WHICH DO NOT COMPLY WITH THE SPECIFICATION SHALL BE INDICATED IN THE MANUFACTURER'S CERTIFICATE REQUIRED IN PARAGRAPH (c) OF THIS SECTION. WHEN THE CARGO TANK-TRUCK COMPLIES WITH ALL THE REQUIREMENTS, THE DATE ON WHICH SAID COMPLIANCE WAS ACCOMPLISHED SHALL BE STAMPED ON THE PLATE. THE CERTIFICATE MUST INDICATE THE RELEVANT DETAILS, THE DATE AND REFERENCE (MANUFACTURER OR CARRIER) COMPLYING JOINTLY [sic] WITH ALL THE REQUIREMENTS.
- (b) EACH PLATE SHALL BE PERMANENTLY AFFIXED BY ANY WELDING, RIVETING OR ANY OTHER EQUALLY EFFECTIVE MEANS. THE PLATE MUST BE MARKED IN CHARACTERS AT LEAST 4.76 MM (3/16 INCH) HIGH BY STAMPING, EMBOSsing OR OTHER METHODS, THEREBY FORMING LETTERS ON OR ABOVE THE SAME METAL PLATE, WHICH LETTERS SHALL CONTAIN AT A MINIMUM THE INFORMATION PRESCRIBED IN PARAGRAPHS (b) (1) AND (b) (2) OF THIS SECTION. THE PLATE MUST NOT BE PAINTED SO AS TO PRECLUDE ITS LEGIBILITY.
  - (1) IF A CARGO TANK-TRUCK IS TO BE PHYSICALLY MODIFIED PHYSICALLY TO COMPLY WITH ANOTHER SPECIFICATION (OR TO ACCOMMODATE A PRODUCT WHICH DOES NOT REQUIRE A TANK IN ACCORDANCE WITH SCT SPECIFICATIONS), SAID MODIFICATIONS MUST BE INDICATED NEXT TO THE IDENTIFICATION PLATE IN ADDITION TO THE MULTI-USE METAL PLATES REQUIRED IN PARAGRAPH (2). THE FOLLOWING SPECIFICATIONS ARE REQUIRED:

TRUCK MANUFACTURER .....

SERIAL NUMBER OF MANUFACTURER .....  
 IDENTIFICATION OF MATERIAL\* SPECIFICATION .....  
 SCT 306; or SCT 307; or SCT 312 .....  
 DATE OF MANUFACTURE .....  
 DATE OF ORIGINAL TEST .....  
 DATE OF CERTIFICATION .....  
 DESIGN PRESSURE ..... kg/cm<sup>2</sup> (psi)  
 PRESSURE TEST ..... kg/cm<sup>2</sup> (psi)  
 HEAD MATERIAL .....  
 SHELL MATERIAL .....  
 CLASS OF WELD .....  
 CLASS OF LINING .....  
 NOMINAL VOLUMETRIC CAPACITY OF TANK BY COMPARTMENT (FROM THE  
 FRONTMOST TO THE REARMOST) .....  
 MAXIMUM NET LOAD ..... KILOS. . . . . (LBS)  
 LOADING LIMIT ..... LPM and/or Kg/cm<sup>2</sup>. .GPM and/or PSIG  
 UNLOADING LIMITS ..... LPM and/or Kg/cm<sup>2</sup>. .GPM and/or PSIG

\* THE FOLLOWING DESIGNATIONS FOR MATERIALS (OR COMBINATIONS THEREOF)  
 MUST BE AFFIXED: ALUMINUM ALLOY STEEL (AL); HIGH STRENGTH LOW  
 ALLOY STEEL (HSLAS); AUSTENITIC STAINLESS CARBON (CS) STEEL (ASS).  
 FOR EXAMPLE, "SCT 306-AL" FOR CARGO TANK-TRUCKS MADE OF ALUMINUM.  
 AN EXAMPLE OF MULTI-USE CARGO TANK-TRUCK COULD BE, "COMBINATION  
 SCT 306-AIA-307-AIA."

(2) MULTI-USE METAL PLATE. IF A CARGO TANK-TRUCK IS TO BE PHYSICALLY  
 MODIFIED, THE MULTI-USE METAL PLATES SHALL BE DISPLAYED NEXT TO  
 THE CERTIFICATION PLATE AND EASILY ACCESSIBLE FOR INSPECTION  
 PURPOSES. MOUNTING OF THE PLATES MUST BE SUCH THAT ONLY THE PLATE  
 IDENTIFYING THE APPLICABLE SPECIFICATION SHALL BE LEGIBLE AT ALL  
 TIMES WHEN THE CARGO TANK-TRUCK IS IN OPERATION AND IN COMPLIANCE  
 WITH SAID SPECIFICATIONS. THE PLATE FASTENING (OR PLATE MOUNTING  
 SET) SHALL BE SUCH AS TO HOLD THE PLATE IN PLACE UNDER NORMAL  
 OPERATING CONDITIONS. THE SAME MARKING SIZE AND METHOD  
 SPECIFICATIONS SHALL BE USED AS FOR THE CERTIFICATION PLATE. THE  
 PLATE SHALL CONTAIN, AT A MINIMUM, THE INFORMATION HEREIN BELOW:

**HIGH STRENGTH LOW ALLOY STEEL (HSLAS)**

**IDENTIFICATION OF SPECIFICATION SCT \_\_\_\_\_**  
**NECESSARY EQUIPMENT**

VENTS	☒	QUANTITY (1)
PRESSURE-ACTUATED	☒	
FUSIBLE	☒	
RUPTURE DISCS (FRAGILE)	☒	
	☒	
LADING DISCHARGE	☒	
TOP PART	☒	
BOTTOM PART	☒	
PRESSURE UNLOADING FITTING	☒	
	☒	
COVERS	☒	
MANHOLE	☒	
FILL OPENING	☒	
☒		

(1) QUANTITY REQUIRED TO MEET THE APPLICABLE SPECIFICATION. IF A PHYSICAL CHANGE IS NOT REQUIRED, THE LETTERS NM (NO CHANGE) MUST FOLLOW THE REQUIRED NUMBER. IF THE CARGO TANK-TRUCK IS NOT EQUIPPED WITH SUCH FITTINGS, THE WORD "NONE" MUST BE INSERTED.

(i) COLOR CODIFICATION: THOSE COMPONENTS WHICH MUST BE CHANGED OR ADDED TO FULFILL THE APPLICABLE SPECIFICATION REQUIREMENTS AND THE APPROPRIATE MULTI-USE PLATE MUST BE IDENTIFIED USING THE FOLLOWING COLORS:

SCT 306 RED  
SCT 307 GREEN  
SCT 312 YELLOW  
WITHOUT SPECIFICATION - BLUE

FURTHERMORE, COMPONENTS WHICH ARE CHANGED OR ADDED SHALL BE STAMPED WITH THE APPROPRIATE SPECIFICATION SCT \_\_\_\_\_ (NUMBER).

(c) CERTIFICATE. A CERTIFICATE SIGNED BY AN AUTHORIZED AND ACCREDITED CERTIFICATION ORGANIZATION, WHICH CERTIFICATE SHALL CERTIFY THAT EACH OF THE CARGO TANK-TRUCKS IS DESIGNED, CONSTRUCTED AND TESTED, AND THAT IT COMPLIES WITH THE REQUIREMENTS CONTAINED IN THE APPLICABLE SPECIFICATION. SAID CERTIFICATE SHALL BE MAINTAINED IN THE ARCHIVES OF THE CARRIER, UNTIL AFTER SAID CARGO TANK-TRUCK HAS BEEN PUT INTO SERVICE.

**5.2 MINIMUM REQUIRED SPECIFICATIONS FOR CARGO TANK-TRUCKS SCT 306, SCT 307 AND SCT 312**

5.2.1 SCT 306 SPECIFICATION

5.2.1.1 GENERAL REQUIREMENTS.

- (a) CARGO TANK-TRUCK SPECIFICATION SCT 306 MUST COMPLY WITH THE GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS CONTAINED IN THIS SECTION.
- (b) DESIGN PRESSURE, THE DESIGN PRESSURE OF A TANK MUST NOT BE LESS THAN THE PRESSURE EXERTED BY THE STATIC LOAD OF A COMPLETELY FILLED OR LOADED TANK IN ITS VERTICAL POSITION.

**5.2.1.2 THICKNESS OF SHELL, HEADS, BULKHEADS AND BAFFLES.**

- (a) MATERIAL THICKNESS. THE MINIMUM AUTHORIZED THICKNESS OF THE TANK MATERIAL, IN ACCORDANCE WITH SECTION 5.1.1, IS INDICATED WITHOUT EXCEEDING THE ULTIMATE TENSILE STRESS BUT SHALL IN NO CASE BE LESS THAN AS INDICATED IN TABLES I AND II OF THIS SPECIFICATION (ANNEXES 1 AND 2).
  - (1) LADING DENSITY. THE MATERIAL THICKNESS VALUES WHICH APPEAR IN TABLES I AND II ARE THE MINIMA BASED ON A MAXIMUM LADING DENSITY OF 0.86 KG/LITER. IF THE TANK IS DESIGNED TO CARRY PRODUCTS WHICH WEIGH MORE THAN 0.86 KG/LITER. THE VALUES EXPRESSED IN LITERS FOR EACH 2.54 CENTIMETERS WHICH ARE USED TO DETERMINE THE MINIMUM THICKNESS OF THE HEADS, BULKHEADS, BAFFLES, AND PARTS OF THE SHELL, IT WILL BE NECESSARY TO TAKE THE REQUIRED CAPACITY IN

LITERS FOR EACH 2.54 CENTIMETERS AND TO MULTIPLY IT BY THE ACTUAL LADING DENSITY EXPRESSED IN KILOS PER LITER AND TO DIVIDE IT BY 0.86.

#### 5.2.1.3 FILLING OPENINGS AND DOMES (MANHOLE ENTRANCE).

- (a) EACH COMPARTMENT WITH A CAPACITY WHICH EXCEEDS 9,500 LITERS MUST BE ACCESSIBLE THROUGH A MANHOLE OF AT LEAST 28 X 38 CM (11 X 15 INCHES). THE MANHOLE AND/OR HEADS OF THE DOME SHALL BE DESIGNED SO AS TO PROVIDE A SECURE CLOSURE AT THE OPENINGS. THEY MUST BE STRUCTURALLY CAPABLE OF WITHSTANDING INTERNAL FLOW [sic] PRESSURES OF 0.63 kg/cm<sup>2</sup> WITHOUT DEFORMATION.

SAFETY MECHANISMS WILL HAVE TO BE INSTALLED SO AS TO PRECLUDE THE FULL OPENING OF THE MANHOLE AND/OR HEAD OF THE DOME IN THE EVENT OF INTERNAL PRESSURE.

#### 5.2.1.4 VENTS OR PRESSURE RELIEF VALVES.

- (a) EACH TANK COMPARTMENT MUST BE PROVIDED WITH VALVES AND SAFETY DEVICES IN ACCORDANCE WITH THE REQUIREMENTS CONTAINED IN THIS PARAGRAPH. ALL SUCH DEVICES SHALL BE IN CONTACT WITH THE VAPOR PHASE [sic] OF THE LADING. STOP VALVES MUST NOT BE INSTALLED BETWEEN THE LADING OUTLET AND SAFETY DEVICE. THE VALVES AND SAFETY DEVICES MUST BE MOUNTED, PROTECTED AND FITTED WITH DRAINS SO AS TO ELIMINATE ANY ACCUMULATION OF WATER, OR FREEZING OF SAID DEVICES, WHICH COULD IMPAIR THE OPERATION OR DISCHARGE CAPABILITY OF THE DEVICE.
- (b) NORMAL VENTING OR PRESSURE RELIEF. EACH TANK COMPARTMENT SHALL BE PROVIDED WITH SAFETY AND VACUUM VALVES HAVING A MINIMUM SURFACE AREA OF 2.8 CM<sup>2</sup>. ALL THE SAFETY VALVES MUST BE CALIBRATED SO AS TO OPEN AT NO MORE THAN 0.07 KG/CM<sup>2</sup> (1 psi) AND ALL THE VACUUM VALVES AT NO MORE THAN 0.026 KG/CM<sup>2</sup> (0.37 psi). THE SAFETY AND VACUUM VALVES SHALL BE DESIGNED SO AS TO PRECLUDE THE LOSS OF LADING THROUGH THE VENT IN CASE OF TRUCK OVERTURN.
- (c) VENTING AND PRESSURE RELIEF PROTECTION DURING LOADING OR UNLOADING. IF THE TANK IS DESIGNED SO AS TO BE LOADED OR UNLOADED WITH THE HEAD OF THE DOME CLOSED, THE VENT OR VENTS SUCH AS DESCRIBED IN PARAGRAPH (b) OF THIS SUBSECTION OR THE ADDITIONAL VENTS WHICH LIMIT THE VACUUM TO 0.07 KG/CM<sup>2</sup> (1 psi) AND THE TANK PRESSURE TO 0.21 KG/CM<sup>2</sup> (3 psi) BASED ON THE MAXIMUM TRANSFER RATING [sic] TO BE INCLUDED IN THE METAL PLATE FOR CERTIFICATION 5.1.8 (b). UNLESS AN EFFECTIVE PROTECTION FROM OVERFLOWING IS EFFECTED, THE SAFETY VALVE SHALL ALSO HAVE A CAPACITY SUFFICIENT TO PREVENT PRESSURE FROM EXCEEDING 0.21 KG/CM<sup>2</sup> (3 psi). THIS SAFETY VALVE MAY OPERATE UNDER PRESSURE OR IN CONJUNCTION WITH THE TANK LOADING MECHANISM, AND IT MUST BE DESIGNED SO AS TO PREVENT ANY LOSS OF LIQUID THROUGH THE VALVE IN CASE OF TRUCK OVERTURN.
- (d) EMERGENCY VENTING IN CASE OF FIRE EXPOSURE.
- (1) TOTAL CAPACITY. THE TOTAL CAPACITY OF THE EMERGENCY VENT IN (m<sup>3</sup>/hr) OF EACH TANK COMPARTMENT MUST NOT BE LESS THAN THAT AS DETERMINED IN TABLE III (ANNEX 3).
  - (2) PRESSURE-ACTUATED VENTS. EACH TANK COMPARTMENT SHALL BE EQUIPPED WITH ONE OR SEVERAL PRESSURE-ACTUATED VALVE OR VALVES, OR WITH

VALVES CALIBRATED TO OPEN AT NO LESS THAN 0.21 KG/CM<sup>2</sup> (3 psi) AND TO CLOSE WHEN THE PRESSURE DECREASES TO 0.21 KG/CM<sup>2</sup> OR LESS. THE MINIMUM VENTING CAPACITY FOR ACTIVATING THE PRESSURE VALVES SHALL BE 170 CUBIC METERS OF FREE AIR PER HOUR (1 KG/CM<sup>2</sup> AND 15.6°C) FOR A TANK AT THE PRESSURE OF 0.35 KG/CM<sup>2</sup> (5 psi). THE PRESSURE-ACTUATED DEVICES OR VALVES SHALL BE DESIGNED IN SUCH A MANNER AS TO PREVENT THE LIQUID FROM LEAKING THROUGH THE DEVICE IN CASE OF SUDDEN ASCENT OR IRREGULAR MOVEMENTS BY THE TRUCK. THEY SHALL ALSO BE DESIGNED SO AS TO OPERATE IN CASE OF A PRESSURE INCREASE UNDER ANY TRUCK OVERTURN CONDITION.

- (3) FUSIBLE VENTS. IF THE PRESSURE-ACTUATED VENTS INDICATED IN PARAGRAPH (d) (2) OF THIS SUBSECTION DO NOT PROVIDE THE TOTAL VENTING CAPACITY INDICATED IN PARAGRAPH (d) (1) OF THIS SUBSECTION, AN ADDITIONAL CAPACITY SHALL BE PROVIDED BY ADDING A VENTING DEVICE OF THE FUSIBLE TYPE, EACH FUSIBLE ELEMENT HAVING A MINIMUM SURFACE AREA OF 8.06 CM<sup>2</sup>. SAID FUSIBLE ELEMENTS SHALL BE LOCATED IN SUCH A WAY THAT THEY CAN NEVER COME INTO CONTACT WITH THE TANK LADING UNDER NORMAL OPERATING CONDITIONS. THE FUSIBLE VENT OR VENTS SHALL BE ACTUATED BY ELEMENTS WHICH OPERATE AT A TEMPERATURE NOT EXCEEDING 121°C. THE VENTING CAPACITY OF THESE DEVICES MUST HAVE A RATING NO GREATER THAN 0.35 KG/CM<sup>2</sup> (5 psi).
- (e) FLOW TESTS AND MARKING OF VENTS OR VALVES. FOR EACH TYPE AND SIZE OF VENTING DEVICES, THE FLOW SHALL HAVE TO BE TESTED AT THE RATINGS SPECIFIED IN THE PREVIOUS PARAGRAPHS. THE ACTUAL FLOW CAPACITY OF THE VENT OR VALVE THUS DERIVED MUST BE STAMPED ON THE ATTACHMENT IN CUBIC METERS OF AIR PER HOUR AT THE PRESSURE IN KILOS PER SQUARE CENTIMETER. THE FUSIBLE VENT OR VENTS SHALL HAVE ITS FLOW RATING DERIVED AT A DIFFERENTIAL OF 0.35 KG/CM<sup>2</sup> (5 psi).
- (1) THESE FLOW TESTS MUST BE CONDUCTED BY THE MANUFACTURER[;] IN ADDITION, THEY MUST BE APPROVED BY A CERTIFICATION ORGANIZATION WHICH SHALL BE ACCREDITED AND AUTHORIZED BY THE SECRETARIAT OF COMMUNICATIONS AND TRANSPORTATION.

#### 5.2.1.5 EMERGENCY FLOW CONTROL.

- (a) EACH LADING DISCHARGE OPENING SHALL BE EQUIPPED WITH AN AUTOMATIC STOP VALVE DESIGNED, INSTALLED AND PROTECTED AND IN ACCORDANCE WITH SECTION 5.1.6 (d), OPERATING IN A MANNER SO AS TO ASSURE AGAINST THE ACCIDENTAL LEAKAGE OF PRODUCTS. THESE VALVES SHALL BE LOCATED WITHIN THE TANK OR AT A POINT OUTSIDE OF THE TANK WHERE THE FLOW LINE ENTERS OR LEAVES THE TANK. THE VALVE SEAT SHALL BE LOCATED WITHIN THE TANK OR BETWEEN THE WELDED FLANGE, ITS COMPANION FLANGE, NOZZLE OR COUPLING. SAID LADING (FLOW) DISCHARGE VALVES MUST CLOSE THROUGH THE FOLLOWING MEANS IN ADDITION TO THE NORMAL ONES: (1) AN AUTOMATIC MEANS OF CLOSING BY THERMAL ACTION, WHICH WOULD BECOME ACTUATED AT A TEMPERATURE NO GREATER THAN 121°C (250°F); (2) A SECONDARY CLOSING SYSTEM WITH REMOTE CONTROL FAR FROM THE TANK FILLING AND DISCHARGE OPENINGS, INTENDED TO BE OPERATED MANUALLY IN CASE OF FIRE OR ANY INCIDENT.

#### 5.2.1.6 TESTING METHOD.

- (a) LEAKAGE TESTS. EACH CARGO TANK-TRUCK MUST BE TESTED WITH A MINIMUM AIR PRESSURE OR HYDROSTATIC PRESSURE OF 0.21 KG/CM<sup>2</sup> (3 psi) OR AT LEAST

EQUAL TO THE TANK DESIGN PRESSURE, WHICHEVER IS GREATER. IF THE TANK HAS COMPARTMENTS, IT WILL BE LIKEWISE TESTED, THE CONTIGUOUS COMPARTMENTS BEING EMPTY AND AT ATMOSPHERIC PRESSURE.

IF AIR PRESSURE IS USED, IT SHALL BE RETAINED FOR A PERIOD OF AT LEAST 5 MINUTES, DURING WHICH ALL THE SURFACE AREA OF ALL THE JOINTS UNDER SAFETY [sic] SHALL BE COVERED WITH A SOAP AND WATER SOLUTION, HEAVY OIL OR OTHER SUITABLE MATERIAL[;] IF IT PRODUCES FOAM OR BUBBLES, THIS SHALL INDICATE THE PRESENCE OF LEAKS. IF HYDROSTATIC PRESSURE IS USED, THE LATTER SHALL BE PRODUCED BY USING WATER OR OTHER LIQUID HAVING SIMILAR VISCOSITY, WHOSE TEMPERATURE SHALL NOT EXCEED 37.7°C (100°F) [DURING THE] TEST, AND THE PRESSURE SHALL BE APPLIED AS PREVIOUSLY DESCRIBED.

PRESSURE IS CONTROLLED WITH A MANOMETER IN THE TOP PART OF THE TANK, AND THEN ALL THE JOINTS UNDER PRESSURE SHALL BE INSPECTED, SO AS TO VERIFY ANY LIQUID EGRESS WHICH MIGHT POINT TO A LEAK. ALL THE SHUTOFF DEVICES SHALL BE IN PLACE WHILE CONDUCTING THE TEST BY EITHER METHOD. DURING THESE TESTS, THE SAFETY DEVICES OR VALVES MUST BE REMOVED AND REPLACED WITH FLANGES OR SIMILAR DEVICES WHICH SHALL BE REMOVED UPON COMPLETION OF THE TEST, WHILE REINSTALLING THE CORRESPONDING SAFETY VALVES OR DEVICES.



ANY LEAK DISCOVERED BY EITHER OF THE PREVIOUSLY DESCRIBED METHODS, OR BY ANY OTHER METHOD, SHALL BE DEEMED AS EVIDENCE OF FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS SPECIFICATION. TANKS WHICH FAIL THIS TEST SHALL BE DULY REPAIRED, AND THE ABOVE-DESCRIBED TESTS SHALL BE CONDUCTED AGAIN UNTIL NO LEAKS ARE FOUND. ONCE THE CARGO TANK -TRUCK PASSES THE TEST, IT SHALL BE PUT INTO SERVICE.

- (b) TESTING FOR DEFORMATIONS OR DEFECTS. EACH CARGO TANK -TRUCK MUST BE TESTED AT THE PRESSURES PRESCRIBED IN PARAGRAPH (a) OF THIS SECTION AND MUST WITHSTAND SAID PRESSURE WITHOUT DEFORMATION, EVIDENCE OF DEFECT OR IMMINENT FAILURE. NON-COMPLIANCE WITH THIS REQUIREMENT WOULD CONSTITUTE SUFFICIENT CAUSE TO REJECT A CARGO TANK-TRUCK OF THIS SPECIFICATION. IF THERE IS A DEFORMATION OR IF FAILURE IS IMMINENT OR DOES OCCUR, THE CARGO TANK-TRUCK SHALL NOT BE PUT IN SERVICE UNLESS IT HAS BEEN SUITABLY REPAIRED. THE REPAIR SHALL BE DETERMINED BY THE SAME TESTING METHOD.

### SCT 307

#### 5.2.2 SPECIFICATION SCT-307; CARGO TANK-TRUCKS.

##### 5.2.2.1 GENERAL REQUIREMENTS.

- (a) SPECIFICATION SCT 307 FOR CARGO TANK-TRUCKS, MUST CONFORM WITH THE GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS, IN ADDITION TO THE SPECIFIC DESIGN REQUIREMENTS CONTAINED IN THIS SECTION.
- (b) THE DESIGN PRESSURE (MAXIMUM ALLOWABLE WORKING PRESSURE) OF EACH CARGO TANK-TRUCK MUST NOT BE LESS THAN 1.75 KG/CM<sup>2</sup> (25 psi). FOR WORKING PRESSURES EXCEEDING 3.51 KG/CM<sup>2</sup> (50 psi), THE TANK MUST BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ASME CODE.
- (c) THE TANKS MUST BE OF CIRCULAR CROSS-SECTION CONSTRUCTION.

##### 5.2.2.2 THICKNESS OF THE SHELL, HEADS AND BAFFLES.

- (a) THICKNESS OF THE MATERIAL. THE MINIMUM AUTHORIZED THICKNESS OF THE TANK MATERIAL, MUST NOT BE LESS THAN THE VALUE DERIVED BY APPLYING THE FOLLOWING FORMULAS, NOR LESS THAN THE VALUES SPECIFIED IN TABLES I AND II OF THIS SECTION:

$$\text{THICKNESS OF THE SHELL} = T_s = \frac{PD}{2SE_s}$$

$$\text{THICKNESS OF THE HEADS} = T_h = \frac{0.885PL}{SE_h} \quad (\text{FOR PRESSURE SOLELY ON THE CONCAVE SIDE})$$

WHERE:

$T_s$  = MINIMUM THICKNESS OF SHELL MATERIAL, NOT INCLUDING THE CORROSION ALLOWANCE OR OTHER LOADS;

$T_h$  = MINIMUM THICKNESS OF HEAD MATERIAL, AFTER BEING FORMED, NOT INCLUDING THE CORROSION ALLOWANCE AND OTHER LOADS;

$P$  = DESIGN PRESSURE, [IN] KILOGRAMS PER SQUARE CENTIMETER (POUNDS PER SQUARE INCH);

$D$  = INNER SHELL DIAMETER IN CENTIMETERS (INCHES);

$L$  = INNER RADIUS OF THE HEAD CHIME IN CENTIMETERS (INCHES); (RADIUS OF THE TRANSVERSAL CROSS-SECTION OF THE HEAD).

$S$  = MAXIMUM ALLOWABLE TENSILE STRESS, [IN] KILOGRAMS PER SQUARE CENTIMETER (POUNDS PER SQUARE INCH), THAT IS, AT A QUARTER OF THE STRENGTH AT THAT OF THE SPECIFIED TENSION. (ONE QUARTER OF THE MINIMUM STRENGTH AT THE TENSION OF THE ANNEALED ALUMINUM ALLOY).

$E_s$  = THE LOWEST EFFICIENCY OF ANY LONGITUDINAL JOINT IN THE SHELL (85% MAX.);

$E_h$  = THE LOWEST EFFICIENCY OF ANY JOINT IN THE HEAD OR TOP (85% MAX.).

(1) THE RADIUS OF THE CHIME OF THE HEAD MUST NOT BE LESS THAN THREE TIMES THE MATERIAL THICKNESS. THE CHIME OF THE HEAD MUST NOT BE LESS THAN THREE TIMES THE MATERIAL THICKNESS FOR BUTT-WELDED HEADS.

(2) FOR HEADS WITH PRESSURE ON THE CONVEX SIDE, THE MATERIAL THICKNESS SHALL BE DERIVED WITH THE PREVIOUS FORMULA, ADDING 67 PERCENT THERETO, UNLESS SAID HEADS ARE ADEQUATELY REINFORCED TO PREVENT EXCESSIVE DEFORMATION.

- (b) CORROSION ALLOWANCE. THE CONTAINERS OR THEIR PARTS SUBJECT TO THINNING OWING TO CORROSION, EROSION OR MECHANICAL ABRASION MUST MAKE PROVISIONS FOR WITHSTANDING [sic] THE SERVICE LIFE THROUGH A SUITABLE INCREASE IN MATERIAL THICKNESS, WHICH MUST BE GREATER THAN AS DERIVED FROM THE DESIGN FORMULAS, OR BY USING ANY OTHER SUITABLE PROTECTION METHOD. THE MATERIAL THUS INCREASED NEED NOT BE OF THE SAME THICKNESS FOR ALL THE PARTS OF THE CONTAINER OR TANK IF IT IS EXPECTED THAT DIFFERENT STRESSES WILL APPLY IN DIFFERENT PARTS.

#### 5.2.2.3 COVERS FOR DOMES OR MANHOLES.

- (a) EACH COMPARTMENT SHALL BE ACCESSIBLE THROUGH A DOME OR MANHOLE OF 38.1 CM OF INNER DIAMETER AS A MINIMUM. THE COVER OF THE MANHOLE SHALL BE DESIGNED SO AS TO ENSURE THE SAFE CLOSING OF THE DOME. ALL JOINTS BETWEEN THE COVERS OF THE DOME AND THEIR SEATS SHALL BE MADE TIGHT AGAINST LEAKAGE OF VAPOR AND LIQUID. IF GASKETS ARE USED, THEY WILL BE OF A SUITABLE MATERIAL WHICH WILL BE LADING-RESISTANT.
- (1) THE COVERS SHALL BE STRUCTURALLY CAPABLE OF WITHSTANDING INTERNAL LIQUID PRESSURES OF 2.81 KG/CM<sup>2</sup> (40 PSIG) OR ONE-AND-A-HALF TIMES THE TANK DESIGN PRESSURE, WHICHEVER IS GREATER, WITHOUT PERMANENT DEFORMATION. SAFETY DEVICES SHALL BE INSTALLED TO PREVENT OPENING OF THE DOME COVER WHEN INTERNAL PRESSURE IS PRESENT IN THE CARGO TANK-TRUCK.

#### 5.2.2.4 VENTS OR PRESSURE RELIEF.

- (a) EACH COMPARTMENT OF THE CARGO TANK-TRUCK MUST BE PROVIDED WITH SAFETY PRESSURE RELIEF VALVES IN ACCORDANCE WITH THE REQUIREMENT CONTAINED IN THIS PARAGRAPH. ALL SUCH DEVICES MUST BE IN CONTACT WITH THE LADING VAPORS. NO STOP VALVE MAY BE INSTALLED BETWEEN THE TANK OPENINGS AND ANY SAFETY VALVE OR DEVICE. THE SAFETY PRESSURE RELIEF VALVES SHALL BE MOUNTED IN SUCH A MANNER AS TO BE PROTECTED, AND THEY SHALL BE FITTED WITH A DRAIN SO AS TO ELIMINATE THE ACCUMULATION OF WATER AND TO PREVENT FREEZING WHICH COULD IMPAIR THE OPERATION OR DISCHARGE CAPABILITY OF THE VALVE OR DEVICE.
- (b) TOTAL CAPACITY. EACH COMPARTMENT OF THE CARGO TANK-TRUCK MUST BE PROVIDED WITH ONE OR SEVERAL VALVES OR DEVICES WITH SUFFICIENT CAPACITY TO LIMIT THE INTERNAL PRESSURE OF THE TANK TO A MAXIMUM OF 130 PERCENT OF THE TANK DESIGN PRESSURE. THIS TOTAL VENTING CAPACITY MUST NOT BE LESS THAN THAT INDICATED IN TABLE III, USING THE EXTERNAL SURFACE AREA OF THE CARGO TANK-TRUCK OR COMPARTMENT AS THE EXPOSED AREA.
- (c) VENTING OF PRESSURE RELIEF ACTUATED BY PRESSURE (SPRING-LOADING). EACH TANK COMPARTMENT MUST BE EQUIPPED WITH ONE OR SEVERAL VALVE(S) ACTUATED BY CALIBRATED PRESSURE SO AS TO OPEN AT NO LESS THAN THE TANK DESIGN PRESSURE. THE MINIMUM VENTING OR PRESSURE-RELIEF CAPACITY FOR PRESSURE-ACTUATED VALVES MUST BE OF: 340 M<sup>3</sup> OF FREE AIR PER HOUR AT 1 KG/CM<sup>2</sup> AND 15.6EC (12,000 FT<sup>3</sup> AT 14.7 psi AND 60EF).

THIS PRESSURE RELIEF IS PER COMPARTMENT OR 32.5 M<sup>2</sup> (350 FT<sup>2</sup>) OF EXPOSED TANK AREA, WHICHEVER IS GREATER.

THIS MINIMUM CAPACITY MUST BE MEASURED AT A PRESSURE OF 130 PERCENT OF THE TANK DESIGN PRESSURE.

THE PRESSURE-ACTUATED VALVES MUST BE DESIGNED SO AS TO OPERATE IN CASE OF A RISE IN TEMPERATURE IN ANY OVERTURN CONDITION. IF USE IS MADE OF PRESSURE FOR THE DISCHARGE, THE RELIEF VALVE MUST HAVE SUFFICIENT CAPACITY TO LIMIT THE INTERNAL PRESSURE OF THE TANK TO 130 PERCENT OF THE DESIGN PRESSURE. (THE MAXIMUM LIMIT SHALL BE INCLUDED IN THE CERTIFICATION PLATE.)

- (d) VENTING OR PRESSURE RELIEF BY FUSE [sic] OR FRANGIBLE DISCS. IF THE VENTING REQUIRED BY PRESSURE ACTUATED IN ACCORDANCE WITH PARAGRAPH (c) OF THIS SUBSECTION DOES NOT PROVIDE THE VENTING CAPACITY REQUIRED BY PARAGRAPH (b) OF THIS SUBSECTION, THEN AN ADDITIONAL CAPACITY MUST BE PROVIDED BY ADDING ATTACHMENTS WHICH WILL ACT AS FUSES OR FRANGIBLE DISCS. EACH FUSIBLE ATTACHMENT MUST HAVE A MINIMUM SURFACE AREA OF 8 CM<sup>2</sup> (1.25 FT<sup>2</sup>) AND MUST BE ACTUATED BY ELEMENTS OPERATING AT A TEMPERATURE WHICH DOES NOT EXCEED 121°C (250°F) WHEN THE TANK PRESSURE READS BETWEEN THE TANK DESIGN PRESSURE AND 130 PERCENT OF THE DESIGN PRESSURE. THESE FUSES MUST BE LOCATED WHERE THEY DO NOT COME IN CONTACT WITH THE LADING UNDER NORMAL OPERATING CONDITIONS.

THE BURSTING PRESSURE OF THESE ATTACHMENTS MUST NOT BE LESS THAN 130 PERCENT NOR GREATER THAN 150 PERCENT OF THE TANK DESIGN PRESSURE.

- (e) FLOW TEST AND MARKING OF VENTS. EACH TYPE AND GAUGING OF THE VENTING OR PRESSURE RELIEF APPURTENANCES MUST HAVE ITS FLOW TESTED AT THE RATINGS SPECIFIED IN THE FOLLOWING APPLICABLE PARAGRAPHS. THE ACTUAL RATING OF THE VENTING FLOW CAPACITY IN CUBIC METERS (FEET<sup>3</sup>) OF FREE AIR PER HOUR AT THE PRESSURE IN KG/CM<sup>2</sup> (psi) THUS DERIVED MUST BE STAMPED ON THE APPURTENANCE.
- (1) THESE FLOW TESTS MUST BE CONDUCTED BY THE MANUFACTURER[;] IN ADDITION, THEY MUST BE APPROVED BY A CERTIFICATION ORGANIZATION, WHICH SHALL BE AUTHORIZED AND ACCREDITED BY THE SECRETARIAT OF COMMUNICATION AND TRANSPORTATION.

#### 5.2.2.5 DISCHARGES OR OUTLETS.

- (a) EACH LADING DISCHARGE OPENING MUST BE EQUIPPED WITH AN AUTOMATIC STOP VALVE DESIGNED, INSTALLED, PROTECTED AND OPERATED IN SUCH A MANNER AS TO PRECLUDE THE ACCIDENTAL LEAKAGE OF CONTENT. THESE VALVES SHALL BE LOCATED INSIDE THE TANK OR BETWEEN THE WELDED FLANGE, ITS COMPANION FLANGE, NOZZLE OR COUPLING. SAID LADING DISCHARGE VALVES (OUTLET) MUST BE CLOSABLE BY THE FOLLOWING MEANS BESIDES THE NORMAL ONES:
- (1) AN AUTOMATIC HEAT ACTUATOR WHICH WILL BECOME ACTUATED AT A TEMPERATURE NO GREATER THAN 121°C (250°F),
- (2) A SECONDARY CLOSING SYSTEM DISTANT FROM THE FILLING OR DISCHARGE OPENINGS OF THE TANK, AND WHICH IS INTENDED TO OPERATE IN CASE OF LEAKAGE OR OTHER ACCIDENT.
- (b) IF VAPOR RECOVERY LINES ARE USED, AN OVERFLOW VALVE MUST BE PROVIDED AT THE TANK CONNECTION, IF A POSITIVE STOP VALVE HAS BEEN PROVIDED BETWEEN THE OVERFLOW VALVE AND THE HOSE CONNECTION.

#### 5.2.2.6 GAUGING DEVICES.

- (a) GAUGING DEVICE DESIGN. EACH TANK COMPARTMENT, EXCEPT FOR TANKS FILLED BASED ON LADING WEIGHT, MUST BE EQUIPPED WITH ONE OR SEVERAL GAUGING

DEVICES WHICH SHALL ACCURATELY INDICATE THE MAXIMUM PERMITTED LIQUID LEVEL IN EACH COMPARTMENT. ADDITIONAL GAUGING DEVICES MAY BE INSTALLED, BUT THEY MAY NOT BE USED AS PRIMARY CONTROLS FOR FILLING AT PRESSURES GREATER THAN THE ATMOSPHERIC PRESSURE. ACCEPTABLE GAUGING DEVICES FOR USE AT PRESSURES ABOVE THE ATMOSPHERIC PRESSURE ARE THE ROTATIVE TUBE, THE ADJUSTABLE-BOTTOM TUBE, AND THE SUBMERGED-LENGTH FIXED TUBE [sic]. GLASS TUBE GAUGES MAY NOT BE INSTALLED IN ANY CARGO TANK-TRUCK.

- (b) FIXED LEVEL INDICATORS. ALL THE LIQUID LEVEL INDICATORS, EXCEPT FOR THOSE IN TANKS FITTED WITH FIXED MAXIMUM-LEVEL INDICATORS, MUST BE LEGIBLE AND PERMANENTLY MARKED WITH GRADUATIONS OF NO MORE THAN 6.6 EC [sic] (20EF). TO INDICATE THE MAXIMUM LEVELS AT WHICH THE TANK MAY BE FILLED WITH LIQUID AT A TEMPERATURE HIGHER THAN 66EC (20EF). SHOULD IT BE IMPRACTICAL TO PUT THESE MARKS IN THE GAUGING DEVICE, THIS INFORMATION SHALL BE MARKED ON A SUITABLE PLATE AFFIXED TO THE TANK NEXT TO THE GAUGING DEVICE.
- (c) DIP TUBES. A FIXED-LENGTH DIP GAUGE, WHEN USED, CONSISTS IN A DIP TUBE OF SMALL DIAMETER EQUIPPED WITH A VALVE AT THE OUTER END AND EXTENDING THROUGH THE TANK AT A SPECIFIC [sic] FIXED LENGTH. IN HORIZONTALLY MOUNTED CYLINDRICAL TANKS, THE FIXED LENGTH IN WHOSE DIRECTION THE TUBE IS INTRODUCED INTO THE TANK SHALL BE SUCH THAT THE INDICATOR SHALL OPERATE SO AS TO INDICATE WHEN THE LIQUID ARRIVES AT THE MAXIMUM LEVEL ALLOWED FOR THIS SET OF STANDARDS.

#### 5.2.2.7 PRESSURE TESTING METHOD FOR CARGO TANK-TRUCKS.

- (a) PRESSURE TEST. THE PRESSURE TEST STANDARD SHALL BE 2.81 KG/CM<sup>2</sup> (40 psi) OR A MINIMUM OF 1.5 TIMES THE DESIGN PRESSURE, WHICHEVER IS GREATER.
- (b) TEST METHOD. EACH CARGO TANK-TRUCK SHALL BE TESTED BY COMPLETELY FILLING (INCLUDING ANY DOMES) WITH WATER OR OTHER LIQUID OF SIMILAR VISCOSITY AND BY APPLYING A PRESSURE OF NO LESS THAN THAT SPECIFIED IN THE ABOVE PARAGRAPH (a) OF THIS SUBSECTION. THE PRESSURE SHALL BE MEASURED IN THE TOP PART OF THE TANK. THE TANK SHALL MAINTAIN THE PRE-WRITTEN [sic] PRESSURE FOR AT LEAST 10 MINUTES. ALL THE TANK ACCESSORIES SHALL BE TESTED AGAINST LEAKS AFTER THEIR INSTALLATION, AND THEY SHALL BE TESTED HERMETICALLY AT NO LESS THAN THE DESIGN PRESSURE OF THE TANK, EXCEPT FOR THE HOSE USED IN SAID TANKS, WHICH HOSE MAY BE TESTED EITHER BEFORE OR AFTER ITS INSTALLATION. A FAILED TEST SHALL BE DEEMED AS EVIDENCE OF NON-CONFORMITY TO THE REQUIREMENTS OF THIS SPECIFICATION. TANKS WHICH DO NOT PASS THIS TEST SHALL BE SUITABLY REPAIRED. THE ADEQUACY OF REPAIR SHALL BE DETERMINED BY THE SAME TESTING METHOD.
  - (i) WHEN IT IS DIVIDED INTO COMPARTMENTS. WHEN THE INSIDE OF THE TANK IS DIVIDED INTO COMPARTMENTS, EACH OF THEM SHALL BE TESTED AS A SEPARATE TANK, SEEING TO IT THAT THE CONTIGUOUS COMPARTMENTS ARE EMPTY AND AT ATMOSPHERIC PRESSURE.

### SCT 312

#### 5.2.3 SPECIFICATION SCT 312.

##### 5.2.3.1 GENERAL REQUIREMENTS.

- (a) SPECIFICATION SCT 312 FOR CARGO TANK-TRUCKS MUST MEET THE GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS IN ADDITION TO THE SPECIFIC REQUIREMENTS OF THIS SECTION.
- (b) TANK DESIGN. TANKS CONSTRUCTED UNDER THIS SPECIFICATION AND LOADED BY PRESSURE GREATER THAN 1.05 KG/CM<sup>2</sup> (15 psi), MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ALL THE SPECIFIC REQUIREMENTS OF THE ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS) CODE. NO TANK SHALL HAVE HEADS, BULKHEADS, RINGS OR SHELL PLATES THINNER THAN AS SPECIFIED IN TABLES I AND II OF THIS SPECIFICATION, NOR SHALL THE SPACING OF BULKHEADS, RINGS OR STIFFENERS OF THE SHELL EXCEED THOSE SPECIFIED.
- (c) THE DESIGN PRESSURE MUST NOT BE LESS THAN THE PRESSURE USED FOR THE DISCHARGE.

**5.2.3.2 THICKNESS OF THE SHELL, HEADS, BULKHEADS AND RINGS OF THE TANKS WITHOUT THE ASME CODE.**

- (a) MATERIAL THICKNESS. THE MINIMUM THICKNESS OF THE MATERIAL OF A TANK AUTHORIZED IN ACCORDANCE WITH SECTION 5.1.1 IS INDICATED WITHOUT EXCEEDING THE ULTIMATE TENSILE STRESS UNDER SECTION 5.1.2 BUT IN NO CASE LESS THAN THAT INDICATED IN TABLES I AND II INCLUDED HEREIN OR BY USING THE FOLLOWING FORMULA FOR ALUMINUM ALLOYS:

- (1) FORMULA FOR ALUMINUM ALLOYS:

MINIMUM THICKNESS OF ALUMINUM ALLOY MATERIALS	$\text{THICKNESS OF STEEL} \times ((3 \times 10^7) / E)^{1/3}$ OF TABLES I AND II
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WHERE E = MODULUS OF ELASTICITY OF THE MATERIAL TO BE USED.

- (b) LINING. EXCEPT AS PROVIDED IN PARAGRAPH (c) OF THIS SUBSECTION, THE TANKS SHALL BE LINED, AND THE MATERIAL USED FOR LINING EACH TANK SUBJECT TO THIS SPECIFICATION MUST BE HOMOGENEOUS, NON POROUS, IMPERFORATE WHEN APPLIED, NO LESS ELASTIC THAN THE VERY METAL OF THE TANK, AND SUBSTANTIALLY IMMUNE TO ATTACK BY THE LADING. SAID LINING SHALL BE DIRECTLY BONDED OR ATTACHED BY OTHER EQUALLY SUITABLE MEANS. THE JOINTS IN THE LINING SHALL BE ACCOMPLISHED BY FUSING THE MATERIALS TOGETHER, OR BY OTHER EQUALLY SATISFACTORY MEANS.
- (c) CONDITIONS UNDER WHICH TANKS NEED NOT BE LINED, AS PROVIDED IN PARAGRAPH (b) OF THIS SUBSECTION, IF:
  - (1) THE TANK MATERIAL IS SUBSTANTIALLY IMMUNE TO ATTACK BY THE LADING; OR,
  - (2) THE TANK MATERIAL IS SUFFICIENTLY STURDY TO WITHSTAND 10 YEARS OF NORMAL SERVICE WITHOUT ITS THICKNESS BEING ANYWHERE DECREASED TO LESS THAN THAT SPECIFIED IN PARAGRAPH (a) OF THIS SUBSECTION CORRESPONDING TO ITS TYPE; OR,
  - (3) THE CHEMICAL REACTION BETWEEN THE TANK MATERIAL AND THE LADING IS SUCH THAT IT ALLOWS THE TANK TO BE SUITABLY PASSIVE OR NEUTRALIZED AND IF THE TANK IS NOT FREQUENTLY CLEANED AND IS NOT USED FOR CARRYING OTHER PRODUCTS.

**5.2.3.3 CLOSURE FOR DOMES OR MANHOLES.**

- (a) EACH COMPARTMENT MUST BE ACCESSIBLE THROUGH A DOME OR MANHOLE IN ACCORDANCE WITH THE CORRESPONDING STANDARDS. THE COVER OF THE DOME OR MANHOLE MUST BE DESIGNED SO AS TO PROVIDE A SECURE COVER [sic]. ALL JOINTS BETWEEN THE MANHOLE COVERS AND THEIR SEATS MUST BE MADE TIGHT AGAINST LEAKAGE OF VAPOR AND LIQUID. GASKETS, IF ANY, SHALL BE OF A SUITABLE LADING-RESISTANT MATERIAL.
- (1) THE MANHOLE COVER SHALL HAVE A STRUCTURAL CAPACITY AT INTERNAL PRESSURES EQUAL TO ONE-AND-A-HALF TIMES THE TANK DESIGN PRESSURE AND IN NO CASE LESS THAN 1.05 KG/CM<sup>2</sup> (15 psi) WITHOUT RESULTING IN PERMANENT DEFORMATION. IT MUST BE PROVIDED WITH SAFETY MECHANISMS SO AS TO PRECLUDE OPENING OF THE DOME COVER WHEN INTERNAL PRESSURE IS PRESENT.

#### 5.2.3.4 VENTS OR VALVES.

- (a) SAFETY VALVE. EACH TANK COMPARTMENT MUST BE EQUIPPED WITH SUITABLE PRESSURE RELIEF VALVES OR MECHANISMS AS REQUIRED BY THE ASME CODE, OR THEY MUST HAVE SUITABLE FRANGIBLE DISCS INSTEAD OF MECHANICAL PRESSURE RELIEF VALVES. SAID DISCS MUST BE DESIGN TO BURST WITHOUT EXCEEDING ONE-AND-A-HALF TIMES THE TANK DESIGN PRESSURE. IF THE TANK IS PROVIDED WITH AIR INLET MECHANISMS, IT MUST HAVE A PRESSURE RELIEF VALVE WITH SUFFICIENT CAPACITY SO AS TO LIMIT THE TANK PRESSURE TO 130 PERCENT OF THE DESIGN PRESSURE. THESE MAXIMUM LIMITS SHALL BE NOTED IN THE PRESCRIBED METAL CERTIFICATION PLATE. THE AIR INLET LINES, IF PERMANENTLY CONNECTED TO A SOURCE OF AIR, MUST BE EQUIPPED WITH A RETENTION VALVE. INSTALLING STOP VALVES BETWEEN THE TANK AND THE PRESSURE RELIEF VALVE OR FRANGIBLE DISC IS PROHIBITED.

#### 5.2.3.5 DISCHARGES OR OUTLETS.

- (a) EACH OUTLET IN OR NEAR THE TOP PART OF A TANK, AS USED TO DISCHARGE THE LADING, MUST BE EQUIPPED WITH A STOP VALVE LOCATED AS CLOSE AS POSSIBLE TO THE POINT OF DISCHARGE OF THE TANK. EACH OF SUCH OUTLETS HAVING ITS FINAL DISCHARGE BELOW THE TOP PART OF THE LEVEL OF LIQUID IN THE TANK MUST BE EQUIPPED WITH AN ADDITIONAL STOP VALVE, BLIND FLANGE, OR SEALED COVER AT THE END OF THE DISCHARGE.
- (b) EXCEPT AS MENTIONED IN PARAGRAPHS (c) AND (d) OF THIS SECTION, EACH LOWER OUTLET MUST BE EQUIPPED WITH A STOP VALVE DESIGNED, INSTALLED AND PROTECTED AS FOLLOWS:
- (1) THE LADING PIPING MUST BE PROTECTED IN SUCH A MANNER AS TO REASONABLY ASSURE AGAINST ACCIDENTAL LEAKAGE OF THE LADING, SAID PROTECTION MUST BE PROVIDED WITH:
- (i) A MACHINED SECTION LOCATED OUTSIDE OF THE FLANGE OF EACH VALVE SEAT AND APPROXIMATELY AT 10 CENTIMETERS (4 INCHES) OF THE CONTAINER, WHICH SHALL BURST IF A FORCE IS EXERTED, LEAVING THE VALVE SEAT AND ITS COUPLING TO THE CONTAINER AND VALVE HEAD INTACT AND CAPABLE OF RETAINING THE LADING. THE SECTION SHALL BE MACHINED IN SUCH A WAY AS NOT TO ABRUPTLY REDUCE THE WALL THICKNESS OF THE ADJACENT PIPING (OR VALVE) MATERIAL [BY] APPROXIMATELY 20 PERCENT OF THICKNESS; OR
- (ii) BY A SUITABLE PROTECTIVE DEVICE CAPABLE OF ABSORBING A

CONCENTRATED HORIZONTAL FORCE OF AT LEAST 3,629 KG (8,000 POUNDS) APPLIED FROM ANY HORIZONTAL DIRECTION, WITHOUT IMPAIRING THE DISCHARGE PIPING, WHICH COULD AFFECT NEGATIVELY THE LADING RETENTION INTEGRITY OF THE DISCHARGE VALVE.

- (2) EACH DISCHARGE VALVE IN THE BOTTOM PART OF THE TANK MUST BE LOCATED INSIDE THE TANK OR IMMEDIATELY NEXT TO THE POINT OF DISCHARGE OUTSIDE OF THE TANK.
  - (i) THE VALVE SEAT MUST BE LOCATED INSIDE THE TANK OR INSIDE THE WELDED FLANGE, NOZZLE, OR COUPLING TO THE POINT OF DISCHARGE OF THE TANK.
  - (ii) EACH DISCHARGE VALVE MUST BE EQUIPPED WITH A REMOTE CONTROL FOR MANUALLY ACTUATING A STOP VALVE AT A POINT NO LESS THAN 3 METERS (10 FEET) AWAY.
- (3) IN ADDITION, A BLIND FLANGE, STOPPER, OR EXCLUSION VALVE IS REQUIRED AT THE END OF THE DISCHARGE OUTLET.
- (c) A LOWER OUTLET ENABLING SHUTTING OF THE LADING DISCHARGE BY A BLIND FLANGE SCREWED ONTO THE TANK SHELL. IF ANY PIPING IS EXTENDED FROM SUCH AN OUTLET, IT MUST BE SECURED WITH A STOP VALVE, WHICH SHALL BE INSTALLED AND PROTECTED AS DESCRIBED IN PARAGRAPH (b) (1) OF THIS SECTION. ALSO, AN ADDITIONAL STOPPER IS REQUIRED AT THE END OF THIS PIPING DISCHARGE.
- (d) THE INNER DISCHARGE VALVES NEED NOT COMPLY WITH SUBPARAGRAPH (b) (2) (ii) OF THIS SECTION WHEN THE TANK CARRIES A LIQUID WITH A CORROSIVE CONTAINING SUSPENDED SOLIDS IN SUFFICIENT QUANTITY TO FORM LAYERS OF SOLID MATERIAL WHICH COULD INTERFERE WITH THE VALVE SEAT SEALING.

#### 5.2.3.6 TESTING METHOD.

- (a) LEAKAGE TEST. EACH TANK SHALL BE TESTED COMPLETELY FULL, INCLUDING THE DOME WITH WATER OR OTHER LIQUID OF SIMILAR VISCOSITY, THE TEMPERATURE MUST NOT EXCEED 37.8°C (100°F) DURING THE TEST, THE APPLIED PRESSURE BEING OF ONE-AND-A-HALF TIMES THE DESIGN PRESSURE BUT NO LESS THAN 21 KG/CM<sup>2</sup> (3 PSIG). THE PRESSURE SHALL BE MEASURED ABOVE THE TANK. THE TANK SHALL MAINTAIN THE PRESCRIBED PRESSURE FOR AT LEAST 10 MINUTES WITHOUT ANY FAILURES DUE TO DEFORMATIONS, LEAKAGE OR EVIDENCE OF IMPENDING FAILURE. ALL CLOSURES SHALL BE LOCATED IN THEIR PLACE DURING TESTING. DURING SAID TESTS, THE PRESSURE RELIEF OR SAFETY MECHANISMS MUST BE SECURED OR, WITHOUT OPERATING ALL THE CLAMPS, STOPPERS, ETC., SHALL BE REMOVED IMMEDIATELY UPON TEST COMPLETION.
- (b) DEFORMATION OR FAILURE TEST. EACH TANK SHALL BE TESTED AT THE PRESSURES PRESCRIBED IN PARAGRAPH (a) OF THIS SUBSECTION, AND MUST WITHSTAND SAID PRESSURES WITHOUT DEFORMATION OR OTHER INDICATION OF IMPENDING FAILURE. THE TANK SHALL NOT BE PUT IN SERVICE, OR RETURNED TO SERVICE, UNLESS SUITABLY REPAIRED. THE REPAIR SHALL BE DEEMED CORRECT UPON FOLLOWING THE SAME TESTING METHOD.
- (c) HEATING SYSTEM TESTING. AFTER INSTALLING AN INNER HEATING SYSTEM CONSISTING OF A HEATING CHAMBER BEFORE THE TANKS ARE PUT IN SERVICE, THE HEATING SYSTEM SHALL BE TESTED. THE SYSTEMS THUS USED SHALL BE THE VAPOR SYSTEM OR THE PRESSURE HOT WATER SYSTEM FOR HEATING THE TANK



CONTENT, AND THEY MUST BE TESTED AT A HYDROSTATIC PRESSURE WHICH TESTS  
A LEAKPROOFNESS OF 14 KG/CM? (200 psi).

- (d) WHEN DIVIDED INTO COMPARTMENTS. WHEN THE INSIDE OF THE TANK IS DIVIDED INTO COMPARTMENTS, EACH COMPARTMENT SHALL BE TESTED AS A SEPARATE TANK.

**6. BIBLIOGRAPHY.**

ANNEX 1

SPECIFICATION SCT 306

TABLE I.- MINIMUM THICKNESS OF HEADS, BULKHEADS AND BAFFLES  
 CARBON STEEL (CS). HIGH STRENGTH LOW ALLOY STEEL (HSLA)  
 AUSTENITIC STAINLESS STEEL (SS)  
 ALUMINUM ALLOY (AL)

MATERIAL THICKNESS	VOLUME CAPACITY IN LITERS PER 2.54 cm.										
	38 OR LESS			FROM 38 TO 53			FROM 53 TO 68				
	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	
MILLIMETERS	1.9483	1.7859	2.44	2.3812	1.9843	2.75	2.7779	2.3812	3.30	3.175	
INCHES	0.07812 5	0.07031 2	0.096	0.09372	0.07812 5	0.109	0.20931	0.0937 5	0.130	0.125	
GAGES	14	15	----	13	14	----	12	13	----	11	

ANNEX 2

SPECIFICATION SCT 306

TABLE II.- MINIMUM THICKNESS OF THE SHELL OR COVER PLATES  
 CARBON STEEL (CS), HIGH STRENGTH LOW ALLOY STEEL (HSLA)  
 AUSTENITIC STAINLESS STEEL (SS)  
 ALUMINUM ALLOY (AL)  
 THICKNESSES IN MILLIMETERS

DISTANCE BETWEEN BAFFLES, BULKHEADS, DEFLECTORS OR RING STIFFENERS			VOLUME CAPACITY IN LITERS PER 2.54 CM.								
			38 OR LESS			FROM 38 TO 53			FROM 53 TO 68		
			CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL
MAXIMUM RADIUS OF SHELL	LESS THAN 178 CM	91.4 CM 91.4 TO 137 137 TO 152.4	1.983 1.983 1.983	1.587 1.587 1.786	2.210 2.210 2.438	1.983 1.983 2.380	1.587 1.786 1.984	2.210 2.438 2.769	1.984 2.380 2.776	1.786 1.984 2.380	2.4 2.7 3.3
	178 OR MORE LESS THAN 229 CM	91.4 CM 91.4 TO 137 137 TO 152.4	1.983 1.983 2.380	1.587 1.785 1.984	2.210 2.438 2.769	1.983 2.380 2.776	1.786 1.984 2.380	2.438 2.769 3.302	2.380 2.776 3.175	1.984 2.380 2.776	2.7 3.3 3.8
	229 OR MORE LESS THAN 317 CM	91.4 CM 91.4 TO 137 137 TO 152.4	1.983 2.380 2.776	1.786 1.984 2.380	2.438 2.769 3.302	2.380 2.776 3.175	1.984 2.380 2.776	2.769 3.302 3.835	2.776 3.175 3.571	2.380 2.776 3.175	3.3 3.8 4.3
	317 CM OR MORE	91.4 CM 91.4 TO 137 137 TO 152.4	2.380 2.776 3.175	1.983 2.380 2.776	2.769 3.302 3.835	2.776 3.175 3.571	2.380 2.776 3.175	3.302 3.835 4.394	3.175 3.571 3.967	2.776 3.175 3.571	3.8 4.3 4.9

ANNEX 3

SPECIFICATION SCT 306

TABLE III

MINIMUM CAPACITY OF EMERGENCY VENT IN CUBIC METERS  
 OF FREE AIR/HOUR AT 1.03 KG/CM<sup>2</sup> AND 15.6°C  
 OR IN CUBIC FEET AT 14.7 psi AND 60°F.

EXPOSED AREA		FREE AIR PER HOUR		EXPOSED AREA		FREE AIR PER HOUR	
M <sup>2</sup>	FT <sup>2</sup>	M <sup>3</sup>	FT <sup>3</sup>	M <sup>2</sup>	FT <sup>2</sup>	M <sup>3</sup>	FT <sup>3</sup>
1.86	20	447.4	15,800	25.54	275	6068	214,300
2.78	30	671.1	23,700	27.87	300	6374	225,100
3.72	40	894.8	31,600	32.51	350	6957	245,700
4.64	50	1118.5	39,500	37.16	400	7504	265,000
5.57	60	1342.2	47,400	41.80	450	8019	283,200
6.50	70	1566	55,300	46.45	500	8512	300,600
7.43	80	1792.4	63,300	51.09	550	8985	317,300
8.36	90	2016	71,200	55.74	600	9438	333,300
9.29	100	2239.8	79,100	60.38	650	9877	348,800
11.14	120	2687.2	94,900	65.03	700	10270	362,700
13	140	3134.7	110,700	69.67	750	10709	378,200
14.86	160	3582	126,500	74.32	800	11106	392,200
16.72	180	4029.5	142,300	78.96	850	11494	405,900
18.52	200	4477	158,100	83.61	900	11873	419,300
20.40	225	5417	191,300	88.25	950	12241	432,300
23.22	250	5751	203,100	92.90	1,000	12601	445,000

NOTE 1: INTERPOLATE FOR INTERMEDIATE SIZES.

ANNEX 4

SPECIFICATION SCT 307

TABLE I.- MINIMUM THICKNESS OF HEADS, BULKHEADS,  
 CARBON STEEL (CS). HIGH STRENGTH LOW ALLOY  
 AUSTENITIC STAINLESS STEEL (SS)  
 ALUMINUM ALLOY (AL)  
 DIMENSIONS IN MILLIMETERS AND IN INCHES

MATERIAL THICKNESS	VOLUMETRIC CAPACITY IN LITERS PER 2.5												
	38 OR LESS			FROM 38 TO 53			FROM 53 TO 68			FROM 68 TO 84			
	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL	CS
MILLIMETERS	1.98 4	1.786	2.77 6	2.18 0	1.984	3.30 2	2.77 6	2.380	3.83 5	3.17 5	2.776	4.39 4	3. 1
INCHES	0.07 8	0.070	0.10 9	0.09 4	0.078	0.13 0	0.10 9	0.094	0.15 1	0.12 5	0.109	0.17 3	0. 1
GAGES	14	15	12	13	14	----	12	13	----	11	12	----	10

ANNEX 5

SPECIFICATION SCT 307

TABLE II.- MINIMUM THICKNESSES OF THE SHELL I  
EXPRESSED IN MILLIMETERS ONLY

DISTANCE BETWEEN HEADS, BULKHEADS OR RINGS												
	38 OR LESS			FROM 38 TO 53			FROM 53 TO 68			FROM 68 TO 84		
	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL	CS	HSLA SS	AL
914 OR LESS	1.984	1.587	2.776	1.984	1.587	2.776	2.380	1.984	3.302	2.380	1.984	3.302
914 TO 1370	1.984	1.587	2.776	1.984	1.786	3.302	2.776	2.380	3.835	2.776	2.380	3.835
1370 TO 1520	1.984	1.786	2.776	2.380	1.984	3.835	3.175	2.776	4.394	3.175	2.776	4.394

ANNEX 6

SPECIFICATION SCT 307

TABLE III

MINIMUM EMERGENCY VENTING CAPACITY,  
 IN CUBIC METERS OF ATMOSPHERIC PRESSURE AIR/HOUR  
 AT 1 KG/CM<sup>2</sup> AND 15.5EC  
 AND IN CUBIC FEET AT 14.7 psi AND 60°F

EXPOSED AREA		FREE AIR PER HOUR		EXPOSED AREA		FREE AIR PER HOUR	
M <sup>2</sup>	FT <sup>2</sup>	M <sup>3</sup>	FT <sup>3</sup>	M <sup>2</sup>	FT <sup>2</sup>	M <sup>3</sup>	FT <sup>3</sup>
1.86	20	447.41	15,800	25.55	275	6068.33	214,300
2.79	30	671.11	23,700	27.87	300	6374.15	225,100
3.71	40	894.81	31,600	32.51	350	6957.48	245,700
4.64	50	1118.52	39,500	37.16	400	7504.00	265,000
5.57	60	1342.22	47,400	41.80	450	8019.37	283,200
6.50	70	1566.93	55,300	46.45	500	8512.09	300,600
7.43	80	1792.46	63,300	51.09	550	8984.98	317,300
8.36	90	2016.17	71,200	55.74	600	9438.05	333,300
9.29	100	2239.87	79,100	60.38	650	9876.96	348,800
11.15	120	2687.28	94,900	65.03	700	10298.89	363,700
13.00	140	3134.69	110,700	69.67	750	10709.49	378,200
14.86	160	3582.10	126,500	74.32	800	11105.92	392,200
16.72	180	4029.51	142,300	78.96	850	11493.87	405,900
18.58	200	4476.91	158,100	83.61	900	11873.32	419,300
20.90	225	5417.04	191,300	88.25	950	12241.44	432,300
23.22	250	5751.18	203,100	92.90	1,000	12601.06	445,000

NOTE 1: INTERPOLATE FOR INTERMEDIATE SIZES.



ANNEX 7

SPECIFICATION SCT 312

TABLE I.- MINIMUM THICKNESS OF HEADS, BULKHEADS AND BAFFLES  
 CARBON STEEL (CS). HIGH STRENGTH LOW ALLOY STEEL (HSLA)  
 AUSTENITIC STAINLESS STEEL (SS)  
 (EXPRESSED IN MILLIMETERS AND IN INCHES OR GAGES)

THICKNESS	VOLUMETRIC CAPACITY IN LITERS PER 2.54 cm.									
	38 OR LESS			FROM 38 TO 53			FROM 53 TO 68			
	PRODUCT DENSITY IN KILOS PER LITER AT 15.6°C									
	1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS
MILLIMETERS	2.776	3.571	4.364	3.571	4.364	6.350	3.967	4.763	6.350	4.364
INCHES AND/OR GAGES	12	10	8	10	8	1/4	9	3/16	1/4	8

ANNEX 8

SPECIFICATION SCT 312

TABLE II.- MINIMUM THICKNESS OF THE SHELL OR COVER PLATES  
CARBON STEEL (CS) HIGH STRENGTH LOW ALLOY STEEL (HSLA)  
AND AUSTENITIC STAINLESS STEEL (SS)  
EXPRESSED IN MILLIMETERS

MAXIMUM RADIUS OF SHELL IN CENTIMETERS	DISTANCE BETWEEN BAFFLES, BULKHEADS OR RING STIFFENERS IN CENTIMETERS	VOLUMETRIC CAPACITY IN LITERS PER 2.54 CM.									
		38 OR LESS			FROM 38 TO 53			FROM 53 TO 68			
		PRODUCT DENSITY IN KILOS PER LITER AT 15.6°C.									
		1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS	1.198 TO 1.557	1.557 TO 1.917	1.198 AND LESS
LESS THAN 178	91.4 91.4 TO 137 137 TO 152.4	2.776 2.776 2.776	3.571 3.571 3.571	4.364 4.364 4.364	2.776 2.776 3.571	3.571 3.571 4.364	4.364 4.364 4.763	2.776 3.571 3.967	3.571 4.364 4.763	4.364 4.763 6.350	3.571 3.967 4.364
FROM 178 TO 229	91.4 91.4 TO 137 137 TO 152.4	2.776 2.776 3.571	3.571 3.571 4.364	4.364 4.364 4.763	2.776 3.571 3.967	3.571 4.364 4.763	4.364 4.763 6.350	3.571 3.967 4.364	4.364 4.763 6.350	4.763 6.350 6.350	3.967 4.364 4.763
FROM 229 TO 317	91.4 91.4 TO 137 137 TO 152.4	2.776 3.571 3.967	3.571 4.364 4.763	4.364 4.763 6.350	3.571 3.967 4.364	4.364 4.763 6.350	4.763 6.350 6.350	3.967 4.364 4.763	4.763 6.350 6.350	6.350 6.350 7.938	6.350 4.763 4.763
MORE THAN 317	91.4 91.4 TO 137 137 TO 152.4	3.571 3.967 4.364	4.364 4.763 6.350	4.763 6.350 6.350	3.967 4.364 4.763	4.763 6.350 6.350	6.350 6.350 7.938	4.364 4.763 4.763	6.350 6.350 6.350	6.350 7.938 7.938	4.763 4.763 6.350

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