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STANDARD FOR VINYL CHLORIDE MONOMER TANK CAR MANWAY COVER AND PROTECTIVE HOUSING ARRANGEMENT AND EMERGENCY SAFETY KIT

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FIRST EDITION: 1980
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1. INTRODUCTION

1.1 Scope. This pamphlet describes a standard manway cover and protective housing arrangement for new Vinyl Chloride Monomer (VCM) tank cars and for the retro fitting of certain existing cars. This standard arrangement will accommodate a safety kit, as also described in this pamphlet, for emergency use in capping leaking fittings.

1.2 History. The member companies of the CGA have recognized for many years the desirability of a readily available emergency safety kit for use in temporarily capping leaking fittings of VCM tank cars. This pamphlet is based on recommendations resulting from many discussions and tests.

1.3 Kit Description. The safety kit includes four cans sized specifically to cap leaking VCM tank car fittings, equipment to hold cans in position, and various tools. Figure 1.1 illustrates the kit and its components. The safety kit is designed for use on DOT 105, 112, and 114 class cars authorized by the Department of Transportation for the shipment of VCM. It functions by placing the appropriate sized can over the leaking fitting, forcing the can which is fitted with a resilient gasket against the manway cover by bracing against a cross-arm channel assembly (included with the safety kit) until a seal at the manway cover is obtained. The car may then be moved with caution to a location where the car's contents can be safely handled.

1.4 Limitations. The safety kit will not accommodate shipments of VCM in tank cars equipped with an 18-inch manway cover unless the manway cover is replaced with that arrangement described in this pamphlet. Existing tank cars with 20-inch manway covers should be checked closely with this recommendation to determine whether or not change-out of the manway cover will be necessary. Both the 18-inch and the 20-inch manway covers described herein provide the maximum available clearance for the safety kit to function effectively when properly applied.

In all cases, valve plugs and valve handles, if present, must be removed in order to apply this safety kit. The protective housing must have four port holes as specified herein to successfully engage the yoke assembly of the kit. Angle valves in excess of 7-inches x 7-5/16 inches (overall dimensions) cannot be capped. Safety valve profiles in excess of 7-3/8 x 7-3/8 inches cannot be capped. Only one defective fitting can be capped at a time with this safety kit except for the thermometer well and sampling device, if present, which can be capped simultaneously, using the auxiliary cross-arm assembly. (See Figure 1)

1.5 Purpose. Leaks in Vinyl Chlorine tank cars rarely occur. When they do occur, however, prompt corrective action is required by competent personnel with special equipment. In the belief that it will be helpful in handling such emergencies, this pamphlet, to be used in conjunction with the VCM emergency kit, is being made available by the Compressed Gas Association, Inc.

2. DEFINITIONS

2.1 AAR. Association of American Railroads.

2.2 Cross-Arm Channel Assembly. The structural beam of the safety kit which spans the top of the protective housing and which braces the cans against the cover plate.

2.3 DOT. Department of Transportation.

2.4 Fittings. Any valve, safety relief device, thermometer well, gaging device, sampling device flanged or threaded at the manway cover.

2.5 Large Capacity Safety Valve. The large safety relief valve mounted on an 8 inch bolt circle.

2.6 Leaking Fitting. Any valve or tank car fitting on the manway cover that is leaking VCM that cannot be stopped by normal procedures.

2.7 Manway Cover. The pressure retaining cover plate used to close the manway opening of the tank. This plate is approximately 2-1/4 inches thick.

2.8 Protective Housing. The assembly bolted to the manway cover by means of its flange. It is equipped with four portholes, a hinged cover with handle, and locking pin. It functions as protection for the tank cars' fittings.

2.9 Small Capacity Safety Valve. The small safety relief valve mounted on 6-1/4 inch bolt circle.

3. DESIGN CONSIDERATIONS

3.1 VCM Safety Kit. Table 1 lists the cans of the safety kit, their sizes, and the fittings which they cap.

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TABLE 1

SAFETY KIT DESCRIPTION AND APPLICATION

Component	Size (Inside Dimensions)	Fits (Outside Dimensions)
Can A	7-5/8 x 7-5/8 inches	Safety Valves not in excess of 7-3/8 x 7-3/8 inches.
Can B	7-1/4 x 7-9/16 inches	Safety valves, 2 inch angle valves, and only those 3 inch angle valves not exceeding 7 x 7-5/16 inches.[1]
Can C	4-3/4 inches I.D.	Gaging devices and small fittings not in excess of 4-1/2 inches O.D.
Can D	3 inches I.D.	Gaging devices and small fittings not in excess of 2-3/4 inches O.D.

3.2 Manway Cover. Traditionally, the manway cover for VCM service has been designed with the safety valve in the center and the gaging device and three angle valves equally spaced in a circle around the safety valve. The manway cover may also provide for a thermometer well and sampling line.

This pamphlet recommends relocation of the safety valve and the gaging device. The gaging device must be located near the center of the manway cover and the safety valve located approximately in the angle valve circle. The thermometer well and sampling line may be located as desired so that Can C or Can D will cap the device if defective.

Figures 2.1, 2.2, and 2.3 show the machine drawing for all 20-inch manway covers for new equipment and for retrofit where required by paragraph 1.4 above. Figure 3.1 shows the cover plate drawing for 18-inch retrofit manway covers having the large safety valve. Figure 3.2 shows the cover plate drawing for 18-inch retrofit manway covers having the small safety valve. Figure 4 shows the detail for the threaded gaging device. Figure 5 shows the drawing for the flanged gaging-device. Figure 6 shows the preferred protective housing.

3.3 VCM Tank Cars. All new tank cars for use in VCM service will require a 20-inch manway cover having a 25-inch bolt circle for attaching to the manway nozzle. Existing cars with 20-inch manway nozzles should use the same arrangement as new cars. The fittings arrangement should conform to paragraph 3.2 of this pamphlet and to requirements of paragraph 4 below, as appropriate.

[1] Most 3 inch angle valves are known not to fit under Can B.

4. SUMMARY OF SAFETY KIT APPLICATIONS

The applicability of this Emergency Safety Kit to various tank cars and manway cover arrangements for new cars and for retrofitting existing cars is as follows:

4.1 New Car Construction. To maximize the applicability of this Safety Kit to new cars, the following recommendations are made for industry standardization of DOT 105 and 112/114 cars.

4.1.1 Twenty Inch manway nozzle cover plate, see Figure 2.1.

4.1.2 Large Capacity Safety Valve located on the transverse centerline approximately on liquid/vapor valve circle oriented so that bolt holes are 45° from transverse centerline. This valve must not exceed the limiting outline of 7-3/8 x 7-3/8 inches.

4.2.3 Small Capacity Safety Valve located on the transverse centerline approximately on the liquid/vapor valve circle. The valve must not exceed 7 x 7-5/16 inch limiting outline.

4.1.4 Angle Valve limiting dimensions must not exceed 7 x 7-5/16 inches (with plug and handle removed) and valve circle must not be less than 7-1/4 inch radius.

4.1.5 Gaging Device located approximately centered on manway cover.

4.1.6 Protective Housing must be as shown in Figure 6.

4.2 Retrofitting Existing Cars. To maximize the applicability of this Safety Kit for existing cars the following recommendations are made

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for industry standardization for retrofitting existing cars with 18-inch manway cover plates:

4.2.1 Large Capacity Safety Valve for DOT 105 or 112/114 cars with an 18-inch manway cover plate would have to be relocated per Figure 3.1 with the following conditions:

4.2.1.1 Safety Valve must be on the transverse centerline, 5-11/16 inches off-center of the cover plate and oriented so that two opposite bolt holes fall on the transverse centerline.

4.2.1.2 Gaging Device must be on the transverse centerline 1-1/8 inch off-center of the cover plate in the direction away from the safety valve.

4.2.1.3 Gaging Device must not exceed 2-3/4 inches O.D.

4.2.1.4 Angle Valve circle must have 6-1/2 inch radius.

4.2.1.5 Angle Valve must be no larger than 7 x 7-5/16 inches (with plugs and handles removed).

4.2.1.6 Protective Housing must be as shown in Figure 6.

4.2.2 Small Capacity Safety Valve for DOT 105 cars with an 18-inch manway cover plate would have to be changed per Figure 3.2 with the following conditions:

4.2.2.1 Safety Valve must be on transverse centerline, 6-9/16 inches off-center of the cover plate.

4.2.2.2 Gaging Device must be at center of cover plate.

4.2.2.3 Gaging Device must not exceed 4-1/2 inch O.D.

4.2.2.4 Angle Valve circle must have 6-1/2 inch radius.

4.2.2.5 Angle Valve must be no larger than 7 x 7-5/16 inches (with plug and handle removed).

4.2.2.6 Protective Housing must be as shown in Figure 6.

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