Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

Certificate of Approval
NMI 9/2/4

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Bartec Model Volutank 3003 Vehicle Tank Measuring System

submitted by Bartec Benke GmbH
Schulstrasse 30
Gotteszell Bavaria 94239
GERMANY

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 80-1 Road Tankers with Level Gauging, Part 1 Metrological and Technical Requirements and Part 2 Metrological and Technical requirements, dated November 2014.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	27/03/14
1	Pattern amended (adding auxiliary flowmeter) – interim certificate issued	13/06/14
2	Pattern amended (validity) – interim certificate issued	19/03/15
3	Pattern approved – interim certificate issued	19/11/15
4	Pattern approved – certificate issued	5/02/16

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number ‘NMI 9/2/4’ and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked ‘NMI P9/2/4’ may be re-marked ‘NMI 9/2/4’ but only by persons authorised by the submittor.

It is the submittor’s responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

Dr A Rawlinson

TECHNICAL SCHEDULE No 9/2/4

1. Description of Pattern **provisionally approved on 27/03/14**
approved 19/11/15

A Bartec model Volutank 3003 road and rail tanker with level gauging system approved for measuring the quantity of the liquid hydrocarbon products other than LPG in the tank/compartments (Figures 1 and 2).

1.1 Field of Operation

The field of operation of the measuring system is determined by the following characteristics:

• Minimum measured quantity, V*min*	¼ of nominal capacity L (#1)
• Capacity of road tanker	0.5 m³ to 50 m³
• Capacity of rail tanker	10 m³ to 120 m³
• Inclination	±5°
• Dynamic viscosity, η (at 20°C)	0.4 to 20 mPa.s (#2)
• Liquid temperature range	–10°C to 50°C
• Ambient temperature range	–25°C to 55°C
• Voltage of road vehicle battery	12 or 24 VDC (nominal)
• Accuracy class for system	Class 0.5
• Applications	Road and rail tankers

(#1) V*min* should be specified for a single compartment tank or for each compartment and shall not exceed one quarter (¼) of its nominal capacity.

(#2) The system is adjusted to be correct for the liquid for which it is to be verified as marked on the data plate.

1.2 The System

This automatic tank gauging system measures the level in a horizontal tank, with compensation for the angle of inclination, in x and y direction in respect of horizontal.

The system is intended for volume measurement on a tanker. During normal operation, the volume is displayed on the calculator/indicator; this volume is derived from the measured level.

Apart from the product volume at delivery temperature, on the basis of standard conversion methods the product volume at reference product temperature may also be viewed displayed.

1.3 Components of the Measuring System

The system includes:

(a) **Tank**

The tank is designed to comply with NMI General Certificate 9/0/B for Vehicle Tanks of Capacities 0.5 to 105 kilolitres.

(b) **Power Supply**

A Bartec slide-in power supply, either:

- a model 6932-100 (16 to 32 V DC, 24 V nominal), or
- a model 6932-107 (9 to 16 V DC, 12 V nominal).

(c) **Dipstick**

A Bartec model 6706-10 electronic dipstick. (Figure 3).

(d) **Temperature Sensor**

A Bartec model 6702-31 temperature sensor. (Figure 4).

(e) **Calculator/Indicator**

A Bartec model 6922-1x unit with a graphic-capable liquid crystal type display (Figure 5).

For the purpose of meter verification the calculator/indicator has provision for displaying the delivery of liquid in litres.

(f) **Auxiliary Flowmeter**

The auxiliary flowmeter is a Tiger model 3003 50 mm meter (Figure 6) for use in horizontal applications only having a field of operation determined by the following characteristics:

- Minimum measured quantity, V_{min} 200 L (#1)
- Maximum flow rate, Q_{max} 1000 L/min
- Minimum flow rate, Q_{min} 100 L/min
- Maximum pressure of the liquid, P_{max} 1965 kPa
- Minimum pressure of the liquid, P_{min} 200 kPa (#2)
- Dynamic viscosity range at 20°C 0.5 to 20 mPa.s (#3)
- Maximum temperature of the liquid, T_{max} 50°C
- Minimum temperature of the liquid, T_{min} -10°C
- Maximum ambient temperature 55°C
- Minimum ambient temperature -25°C
- Accuracy class 0.5

(#1) When the calculator/indicator is set to indicate volume in 0.1 L increments.

(#2) For satisfactory operation of the gas elimination device.

(#3) The flowmeter is adjusted to be correct for the liquid for which it is to be verified as marked on the data plate.

1.4 Software Versions

The metrologically relevant software modules are as follows:

Module	Version	Signature
m-srt	1.1.0	517d03
m-dipstick	1.5.0	7dc451
m-tmup	1.0.7	0de79b
lib3003db	1.1.0	aab9e7
m-hmi	1.1.1	3b356a
	1.3.0	9f71f2
emfx	1.0.14	37d2c2
umg	1.2.0	21932d
m-print	1.4.0	03ebe3
m-kmif_ex	1.0.0	188c57

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

Provision is made for the instrument to be sealed by the application of mechanical seals as shown in Figures 7 and 8.

1.7 Descriptive Markings and Notices

Instruments are marked with the following data, together in one location, in the form shown at right:

Manufacturer's mark, or name written in full	……
Meter model	……
Serial number	……
NSC approval number	NMI 9/2/4

In addition, tanks shall comply with any relevant requirements given in NITP 9 *National Instrument Test Procedures for Vehicle Tanks* in regard to markings, numbering and notices.

TEST PROCEDURE

The measuring system can be verified using the procedures given in the NMI documents NITP 9 *National Instrument Test Procedures for Vehicle Tanks* and General Certificate 9/0/B *Vehicle Tanks of Capacities 0.5 to 105 kilolitres*.

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

The maximum permissible errors, that is, the difference between the volume transferred as indicated by the instrument and the transferred volume measured using traceable equipment, are:

±0.5% for the measuring system (in-service inspection); and

±0.3% during calibration adjustment of the instrument.

The verification may be carried out by either delivering a traceable volume into the Bartec volutank 3003-tank compartment, or alternatively by dispensing the liquid from the Bartec volutank 3003-tank compartment via traceable volume measuring equipment.

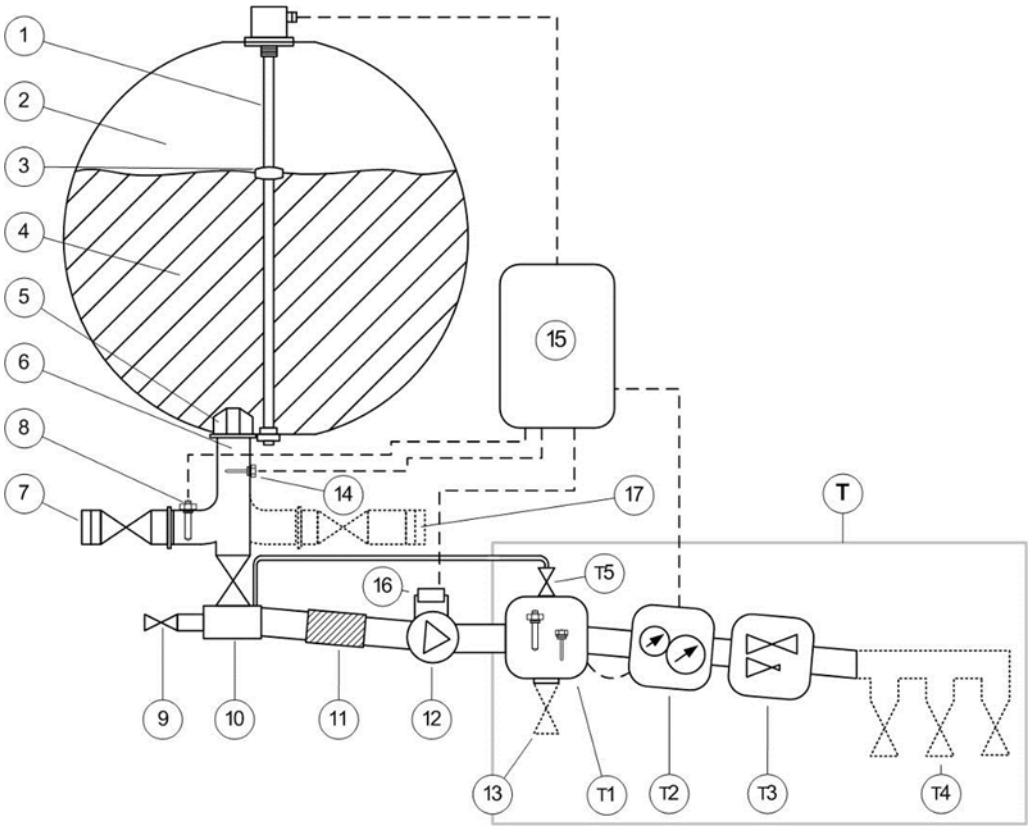
Within the field of operation, the reference equipment must be able to measure the volume at any level in the Bartec volutank 3003-tank compartment with sensitivity at least three times better than a volume equivalent to ±1 mm change in liquid level.

Up to 200 calibration points can be entered to define the tank profile (height versus volume). The tank profile shall be determined at an appropriate number of intervals to ensure that for contents in the tank greater than 2 × minim FIGURE

um measured quantity, the interpolated volume between two adjacent calibration points is within 0.3%.

For each tank, the calibration points shall include the minimum liquid level (rounded up to the nearest 10 L) and the maximum liquid level (rounded down to the nearest 10 L). These maximum and minimum volumes for each tank/ compartment shall be indicated to the user as the operating range of the instrument.

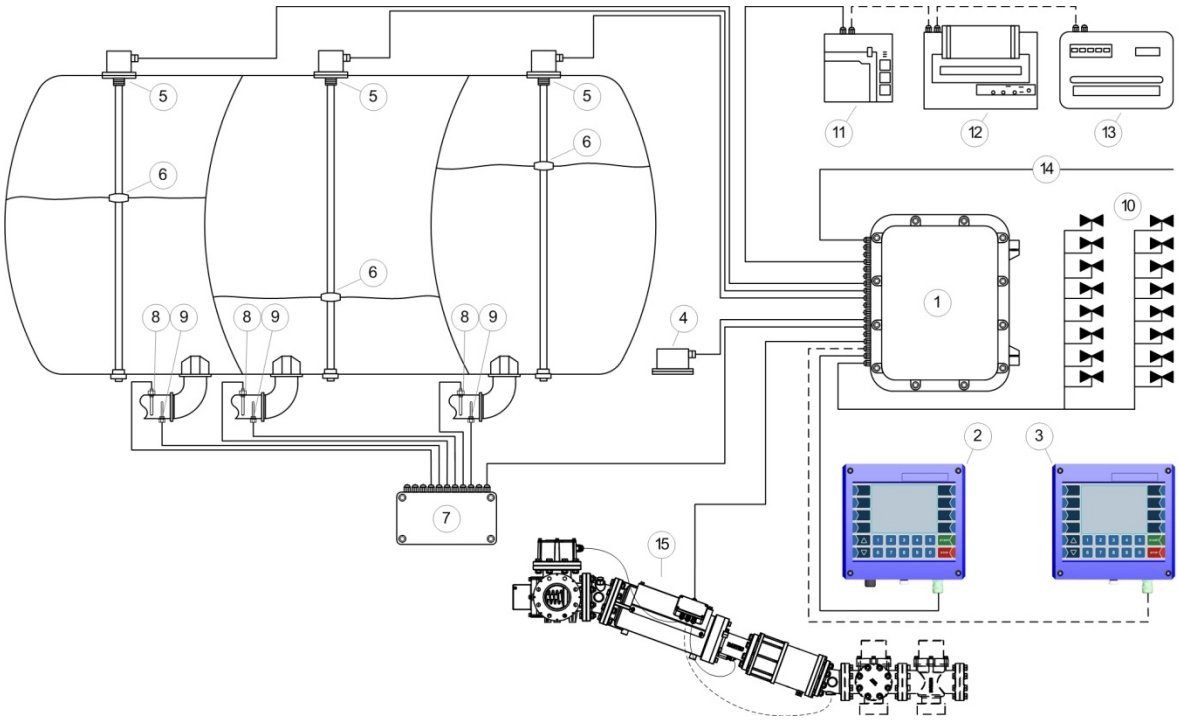
FIGURE 9/2/4 – 1



1. Filling level sensor	15. Electronics of measurement and control unit
2. Measuring vessel/measuring chamber	16. Controlling element of pump motor if required
3. Float	17. Discharge line to right side if required
4. Product	
5. Bottom valve	
6. Outlet pipe	
7. Dry coupling (API)	
8. Residual quantity sensor	T Auxiliary meter
9. Collector venting valve	T1 Distributor valve (Valve A) with temperature, pressure and empty alarm sensors
10. Collector line (represented with valve function)	T2 Measuring tube with filling level sensor and measurement turbine
11. Filter	T3 Multifunction valve (Valve D)
12. Pump	T4 Optional discharge valves (may be omitted if only one full hose)
13. Coupling of empty hose with sight glass if required	T5 Venting valve
14. Temperature sensor	

Bartec Model Volutank 3003 Vehicle Tank Measuring System

FIGURE 9/2/4 – 2



1. Basic module
2. Display and control unit (calibration memory/switch)
3. Display and control unit
4. Inclination sensor
5. Dipstick
6. Float
7. I-box Namur (plus)
8. Residual quantity sensor (WLS Namur)
9. Temperature sensor
10. Magnetic valves (optional via terminal box)
11. Slip printer
12. DIN A4 printer
13. DIN A4 printer
14. Voltage supply of onboard power supply (12/24 V)
15. Auxiliary meter

Bartec Model Volutank 3003 Vehicle Tank Measuring System
(maximum expansion level)

FIGURE 9/2/4 – 3

A Bartec Model 6706-10 Electronic Dipstick

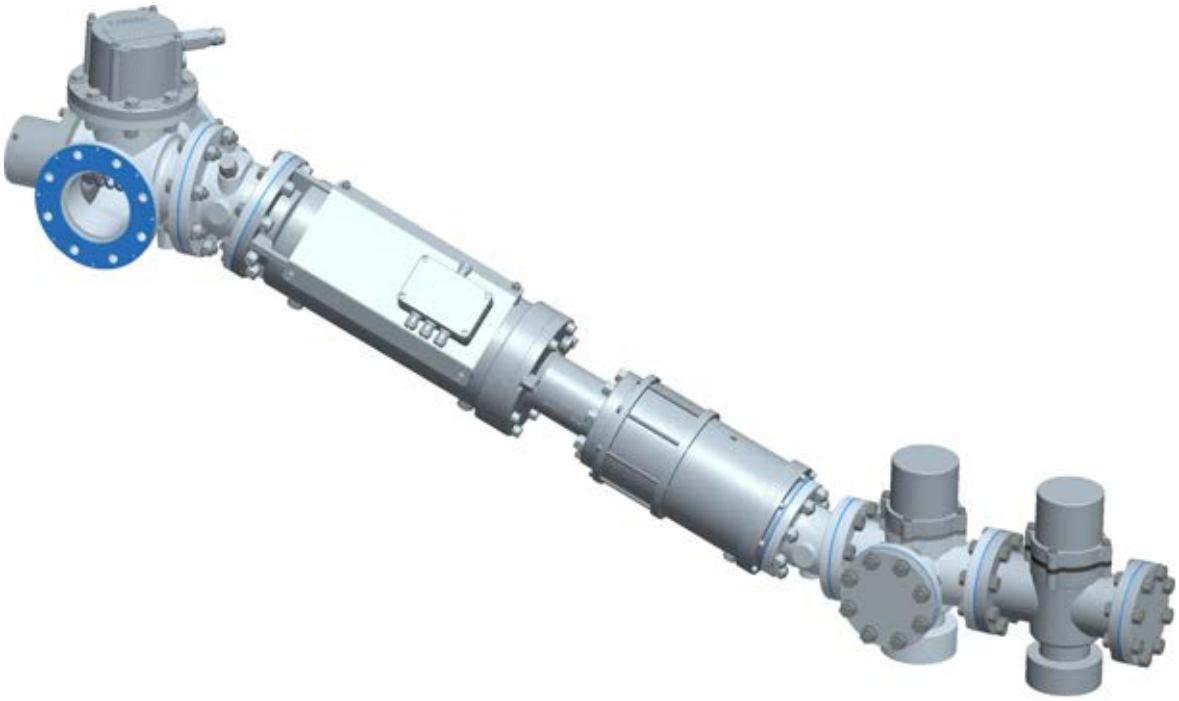
FIGURE 9/2/4 – 4

A Bartec Model 6702-31 Temperature Sensor

FIGURE 9/2/4 – 5

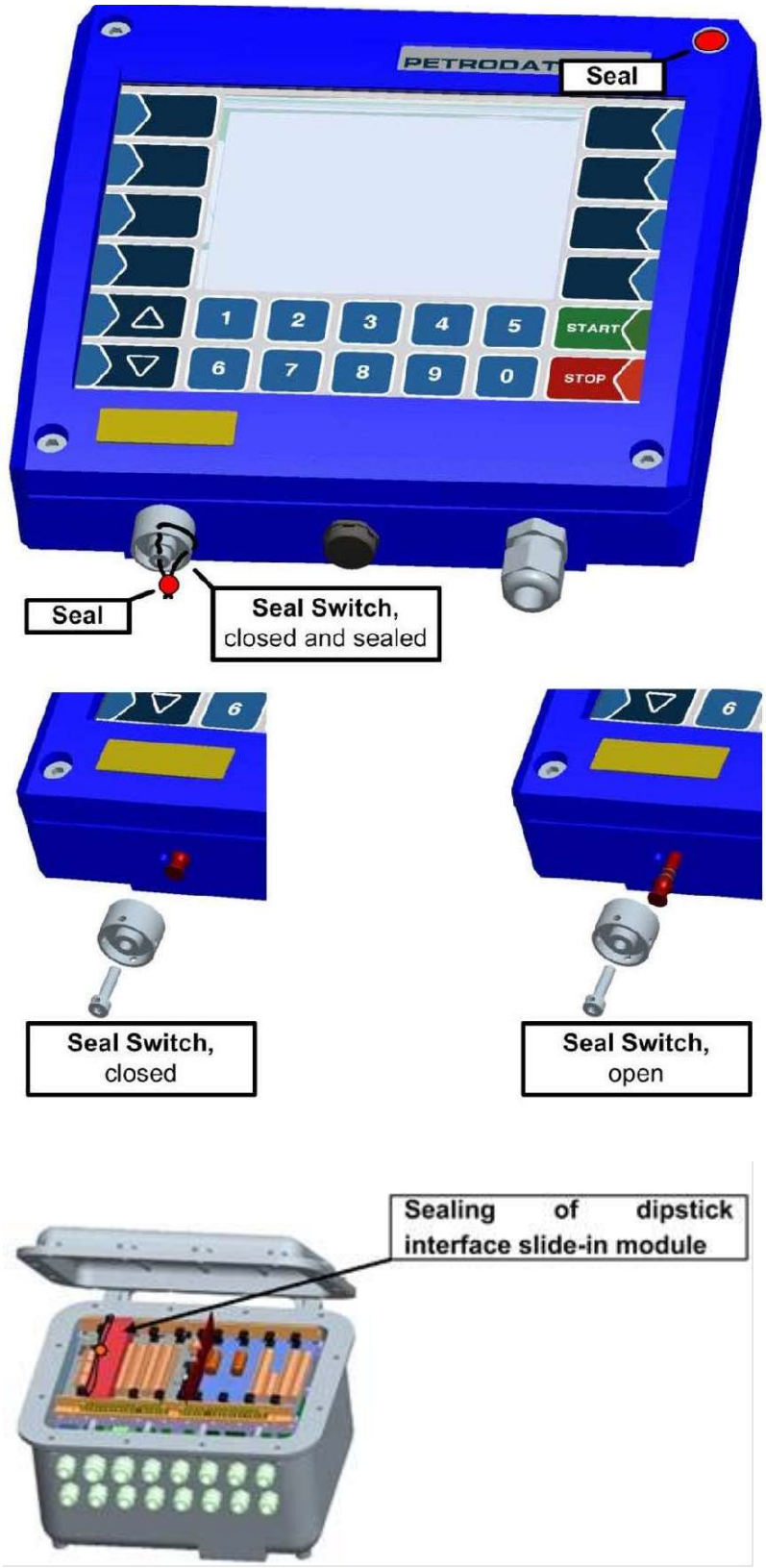
A Bartec model 6922-1x Calculator/Indicator

FIGURE 9/2/4 – 6



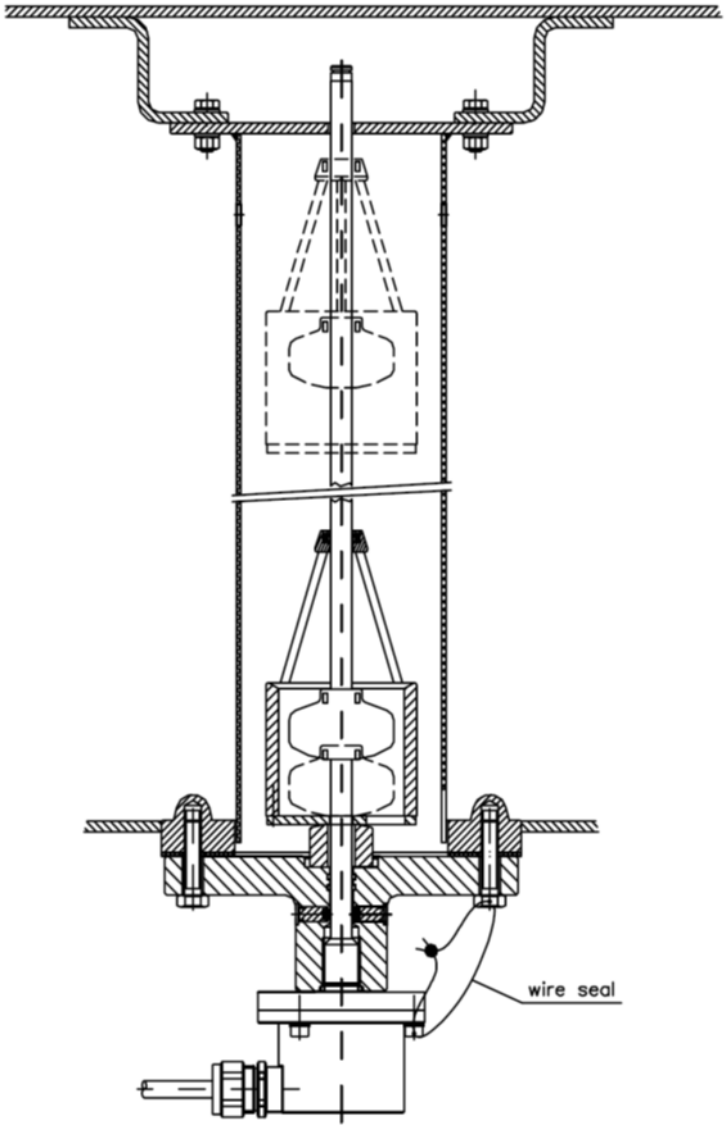
Tiger Model 3003 Auxiliary Flowmeter

FIGURE 9/2/4 – 7



Typical Sealing Method/s

FIGURE 9/2/4 – 8



Typical Sealing Method

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