



# **TRANSNET ENGINEERING**

## **PRODUCT SYSTEMS DEVELOPMENT**

### **WAGONS**

#### **SAFETY RELIEF VALVE FOR XB-5 UP TO XB-14 TANK WAGONS**

**Revision 02**

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**EW\_KLP\_SPEC\_2001**

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## SUMMARY OF REVISION

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The following revisions have been made in this revision:

Change	Description
ECN0003092 Rev 00 to 01	<i>Section 1.3:</i> A picture was added. Table 1: seal material was removed, and cracking pressure was added. <i>Section 1.10:</i> was added to include the testing procedure for the safety relief valve.
ECN0003106 Rev 01 to 02	<i>Cover page:</i> Title changed from “XB-1 to XB-10” to “XB-5 to XB-14”. <i>Section 1.3:</i> The statement “140kPa or less” is changed to “140kPa with the cracking pressure of 135 kPa” and “200kPa or less” is changed to “200kPa with the cracking pressure of 190 kPa”. Table 2 has been updated to include XB-11 to XB-14 and remove XB-1 to XB-4. <i>Section 1.10:</i> The title was updated to remove “refurbish” and the wording “test rig” was changed to “test bench”

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# 1 INTRODUCTION

## 1.1 Scope of Specification

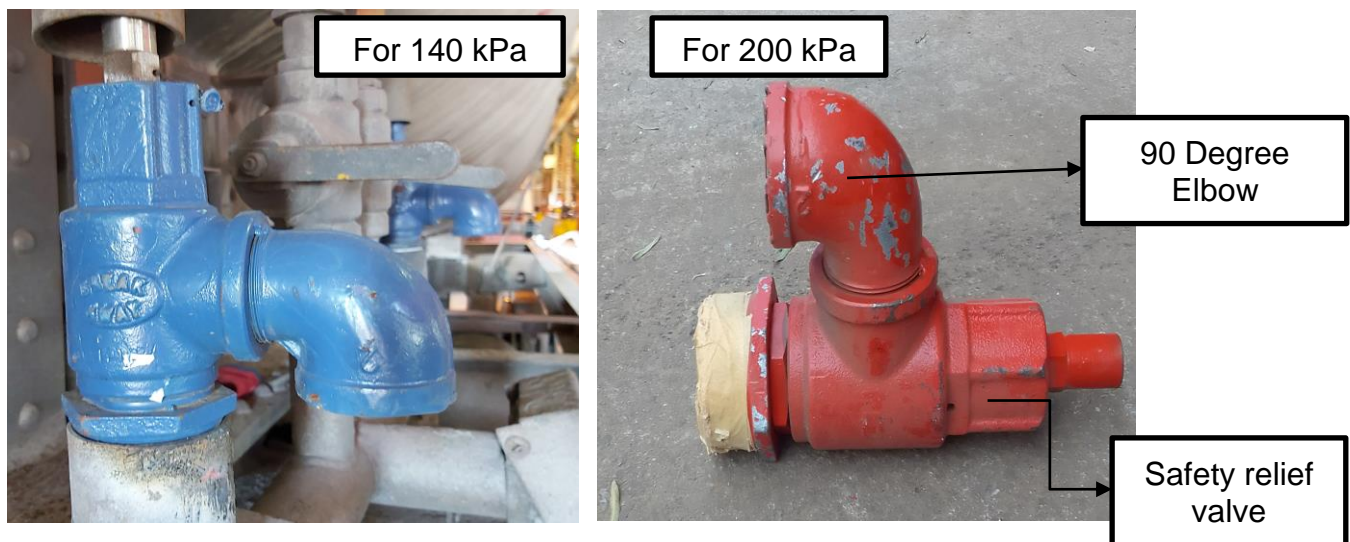
This specification covers the technical requirements for new safety relief valves, which have an allowable working pressure of 200 kPa (Item No. 68002767) and 140 kPa (Item No. 68062306). These valves are used on XB-5 up to XB-14 tank wagons, which transport Cement, Lime, and Tioxide powdery products.

## 1.2 Design Standards

The safety relief valve (SRV) shall meet the requirements mentioned in the latest revision of the Pressure Equipment Regulations (PER) issued by the Department of Labour, Occupational Health, and Safety Act, 1993.

## 1.3 Safety Relief Valve Requirements

The safety relief valve with a 50mm high-capacity pop type must be fitted on a 65 mm reducing socket with a 90-degree elbow and baffle plate. For reference purposes see Figure 1.

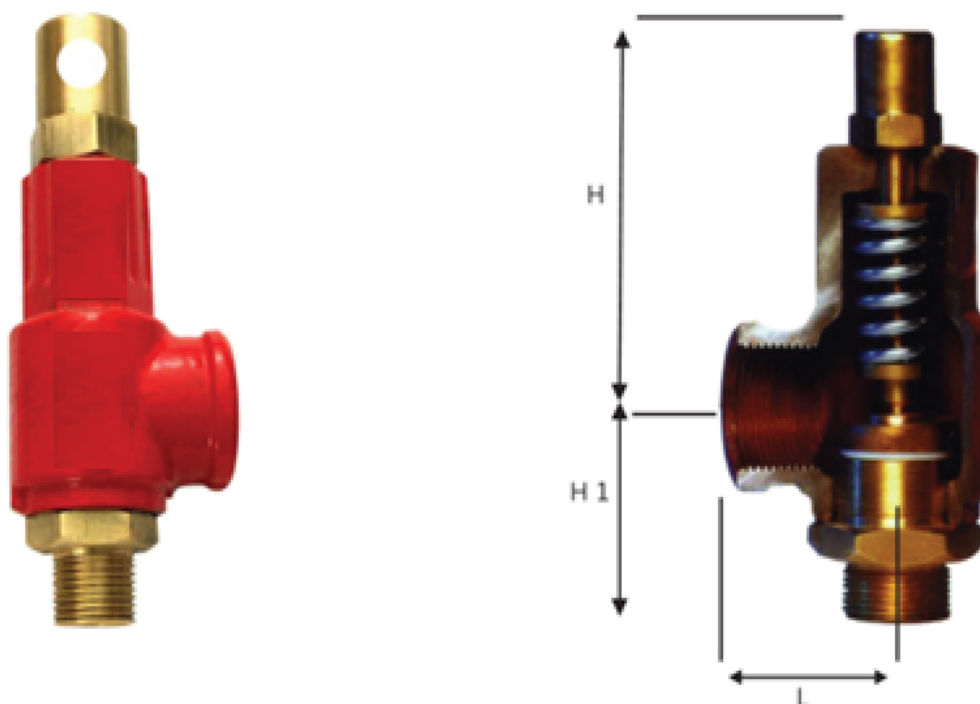


**Figure 1: Safety Relief Valve fitted with a 90° elbow.**

For the specification and the overall dimensions of the safety relief valve see Table 1 and Figure 2.

**Table 1: Safety Relief Valve Parameters**

Valve Type	Safety Relief Valve
Size	50mm High Capacity
Max allowable working pressure	140 kPa or 200 kPa as per wagon type (see Table 2)
Max cracking pressure /Max set pressure	140 kPa or 200 kPa as per wagon type (see Table 2)
Min cracking pressure/ Min set pressure	135 kPa (for 140kPa valve) or 190 kPa (for 200kPa valve)
Valve Air Flow	17 m <sup>3</sup> /min (600 CFM) or more
Spindle Material	Brass or stainless steel
Body Material	Cast Iron
Seat Material	Brass
H (From Figure 2)	150 mm
H1 (From Figure 2)	95 mm
L (From Figure 2)	65 mm
Flow direction	Downwards with elbow fitted (see Figure 1)
Body paint colour for the 200kPa SRV	Red
Body paint colour for the 140kPa SRV	Blue



**Figure 2: Safety relief valve overall dimension**

The safety relief valve shall be set at two different set pressures as per the wagon type, the wagon type with a maximum working pressure of 140kPa shall have a Max cracking pressure/Max set pressure of 140kPa with a Min cracking pressure/Min set pressure of 135 kPa and the wagon type with a maximum working pressure of 200kPa shall have Max cracking pressure/Max set pressure of 200kPa with the Min cracking pressure/Min set Pressure of 190 kPa (Refer to body paint colour coding required as well in Table 1). Table 2 below shows the maximum allowable working pressure per wagon type for XB-5,6,8 to XB-14.

**Table 2: Set Pressure Per Wagon Type**

<b>XB Wagon Type</b>	<b>Min cracking pressure/ Min set pressure</b>	<b>Maximum Working Pressure</b>	<b>Max cracking pressure /Max set pressure</b>
XB-5	135 kPa	140 kPa	140kPa
XB-6	190 kPa	200 kPa	200kPa
XB-8	190 kPa	200 kPa	200kPa
XB-9	190 kPa	200 kPa	200kPa

XB-10	190 kPa	200 kPa	200 kPa
XB-11	190 kPa	200 kPa	200 kPa
XB-12	190 kPa	200 kPa	200 kPa
XB-13	190 kPa	200 kPa	200 kPa
XB-14	190 kPa	200 kPa	200 kPa

The safety relief valves when fully opened should not be above 10% of the design pressure as stipulated in PD5500 section 3.13.2, which means the 200kPa valves are limited to 220kPa fully open pressure and the 140 kPa are limited to 154 kPa fully open pressure.

#### **1.4 Certification and Gaurentee**

- The safety relief valve is to be supplied with all relevant certificates as proof of guarantee.

#### **1.5 Documentation**

The following documents are required to accept the safety relief valve.

- Material specifications.
- ISO/SANS specifications for material and product compliance.
- Material and product compliance certificate(s) (Leak test and pressure set certificate(s)).

#### **1.6 Test Certificate**

The test certificate(s) must include the following information:

- Manufacture's Name
- Year of manufacture
- Valve Model
- Design Pressure
- Set Pressure / cracking pressure
- Flow Rate
- Test Date

- Valve serial number
- Body and seat material
- Guaranty/Warrantee period
- Recorded test results

### **1.7 Safety relief valve data plate- marking**

The manufacturer must ensure that the data plate and/or body marking are permanently fixed and include the following information:

- Name of Manufacturer
- Serial Number
- Set Pressure/ cracking pressure in Pascal
- Valve size
- Valve model

### **1.8 Quality Assurance Provision**

The supplier must be ISO accredited, however, if that is not the case the supplier must have a proper quality management system that is in line with the principles in the policy on the supplier quality management framework Doc No: OPS\_CQ\_KLP\_PP\_0001.

### **1.9 Maintenance**

During delivery, the supplier shall provide a maintenance schedule that lists all the safety relief valve components, kit replacement parts and recommended maintenance frequencies.

### **1.10 Testing Procedure for the New Safety Relief Valves**

The new (Item No. 68002767 and 68062306) safety relief valves must be tested as per the procedure below. For the safety relief valves to be repaired, the specification RW/TE/SPC/0004 and the below procedure must be followed.

#### **1.10.1 Safety Relief Valves with the Max cracking / Max Set Pressure 200kPa**

- Testing shall be conducted on a sample rate of 100% per batch
- The unit shall be fitted to a pressure test bench utilizing air

- The valve must be subjected to a hold pressure of 5 kPa below the set pressure/cracking pressure (for example, if the set pressure is 190kPa then the valve must be subjected to a hold pressure of 185kPa) for 2 minutes (NB: during this stage the pressure must remain constant).
- After 2 minutes, the pressure in the valve can be released. This stage must be done three times on the same valve, and the pressure reading and results must be constant and captured per valve. Test pressure at three different pressures.
  - 185 kPa or 195 kPa (depending on the set pressure/cracking pressure used); Check if the valve is not leaking and the pressure is not dropping or rising, when the test bench input pressure is on hold (No leaks allowed, and the pressure should remain constant)
  - 190 kPa up to 200 kPa; Check cracking and pressure reading and record it (once the valve is cracking, the test bench input pressure must be held. At this point monitor the pressure gauge to check if the pressure remains constant for 2 minutes).
  - The valves must be fully open below 220 kPa; Check the pressure and record the readings.
- When the valve is still under pressure, a leak test must be done. NB: No air leakage is permitted. See **Clause 1.10.3** for the leak test.

**Note: This procedure is for XB 6, XB-8 up to XB-14 See Table 2.**

#### **1.10.2 Safety Relief Valves with the Max Set Pressure of 140kPa as per the Table 2**

- Testing shall be conducted on a sample rate of 100% per batch
- The unit shall be fitted to a pressure test bench utilizing air
- The valve must be subjected to a hold pressure of 5 kPa below the set pressure/cracking pressure (for example, if the set pressure is 135kPa then the valve must be subjected to a hold pressure of 130kPa) for 2 minutes (NB: during this stage the pressure must remain constant).
- After 2 minutes, the pressure in the valve can be released. This stage must be done three times on the same valve, and the pressure reading and results must be constant and captured per valve. Test pressure at three different pressures.

- 130 kPa or 135 kPa (depending on the set pressure/cracking pressure used); Check if the valve is not leaking and the pressure is not dropping or rising, when the test bench input pressure is on hold (No leaks allowed, and the pressure should remain constant)
- 135 kPa up to 140 kPa; Check cracking and pressure reading and record it (once the valve is cracking, the test bench input pressure must be held. At this point monitor the pressure gauge to check if the pressure remains constant for 2 minutes).
- The valves must be fully open below 154 kPa; Check the pressure and record the readings.
- When the valve is still under pressure, a leak test must be done. NB: No air leakage is permitted. See **Clause 1.10.3** for the leak test.

**Note: This procedure is for XB 5: See Table 2.**

### **1.10.3 Leak Test Method for Both Safety Relief Valves**

- Soap water must be sprayed on the body and connections of the valve, under pressure, to check for leaks.
- Visibility of “leak” bubbles will indicate that there is a leak, and the leak should be fixed, and the valve shall be retested with no “leak” bubbles visible during the test.
- The valve must be connected to a test bench and then submerge the elbow under clean/clear water. The valve must then be pressurised to check for any visible air bubbles escaping as stipulated by the below pressure ranges.
- The pressure must be induced at various pressures **for the 140kPa valve i.e., 0 -25, 50-75, 100 up to 5 kPa below the set / cracking pressure** and **for the 200 kPa valve i.e. 0 -25, 50-75, 100-150, 150 up to 5 kPa below the set / cracking pressure**
- Once it reaches 5kPa below the set/ cracking pressure, hold for 2 minutes and check for leaks.
- Each valve must be subjected to the above test pressure ranges for not less than 1-2 minutes per pressure range interval and total time under pressure should add up to 10 minutes (NB: during this stage the pressure must remain constant, and no air bubbles must be visible except during cracking/set pressure as stipulated in Table 1).

- The valve(s) with air bubbles must then be fixed, and the entire set pressure and leak test should be repeated to meet all the set and test requirements.
- After 10 minutes the pressure in the valve can be released. The start time and end time of the tests should also be captured.

## DOCUMENT AUTHORITIES

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