

File Issue: 001	TEST SHEETS R67-01 LPG EQUIPMENT	GASTEC A
Report Number: 122060	Gas dosage unit when not combined with the gas Injection device(s)	Page: TM 1/00


Annex 12: GAS DOSAGE UNIT WHEN NOT COMBINED WITH THE GAS INJECTION DEVICE(S)

Key to Test Sheets:	YES = YES	NA = Not Applicable	NT = Not Tested	NO = NO	Example:	YES-NA-NT-NO
Notes: When filling in Test Sheets, answers are crossed out which are not applicable for that clause:						

	Annex 12: Gas dosage unit when not combined with the gas injection device(s)	
2	Component classification : Class 2 Class 2A	YES-NA-NT-NO YES-NA-NT-NO
3	Classification pressure 450 kPa 120 kPa	YES-NA-NT-NO YES-NA-NT-NO
4	Design temperatures: -20 °C to 120 °C	YES-NA-NT-NO
5	General design rules -meets paragraph 6.15.2 -meets paragraph 6.15.3.1 -meets paragraph 6.15.4 -meets paragraph 6.15.5	YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO
6	The component meets the applicable test procedures: - Over pressure test Annex 15, par. 4 - External leakage Annex 15, par. 5 - High temperature Annex 15, par. 6 - Low temperature Annex 15, par. 7 - LPG compatibility Annex 15, par. 11 - Corrosion resistance Annex 15, par. 12	YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO* YES-NA-NT-NO

* See declaration

Job Reference: 122060	Initials: Ker
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File Issue: 001	TEST SHEETS R110 CNG EQUIPMENT	
Report Number: 122060	Gas/air mixer or injector	Page: TM 2/00

Annex 4G: GAS/AIR MIXER OR INJECTOR
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Key to Test Sheets:	YES = YES	NA = Not Applicable	NT = Not Tested	NO = NO	Example:	YES-NA-NT-NO
Notes: When filling in Test Sheets, answers are crossed out which are not applicable for that clause.						

	Definition: a gas/air mixer is a device for introducing gaseous fuel into the engine intake manifold.	
2.1	The material constituting the gas/air mixer or injector which is in contact with the CNG shall be compatible with the CNG. In order to verify this compatibility the procedure specified in annex 5D has to be used.	See below
2.2	The gas/air mixer or injector shall conform to requirements of class 1 or 2 components, according to their classification	See below
2.4	Electrical operated components containing CNG shall comply with the following (i) They shall have a separate ground connection (ii) The electrical system of the component shall be isolated from the body (iii) The injector shall be in closed position when the electric current is switched off	YES-NA-NT-NO YES-NA-NT-NO YES-NA-NT-NO
5A	Overpressure or strength	YES-NA-NT-NO
5B	External leakage	YES-NA-NT-NO
5C	Internal leakage	YES-NA-NT-NO
5D	CNG compatibility	YES-NA-NT-NO*
5E	Corrosion resistance	YES-NA-NT-NO
5F	Resistance to dry heat	YES-NA-NT-NO*
5G	Ozone ageing	YES-NA-NT-NO*
5H	Temperature cycle	YES-NA-NT-NO
5L	Durability test	YES-NA-NT-NO
5N	Vibration resistance	YES-NA-NT-NO
5O	Operating temperatures	YES-NA-NT-NO

* See declaration

Job Reference: 122060	Initials: Ken
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File Issue: 002	RESULT SHEETS R67-01 LPG EQUIPMENT	GASTEC
Report Number: 122060	HYDROSTATIC STRENGTH	Page: RM 1/00

Product:	Dosage unit type 30
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Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	4		
Testing Equipment (when no accuracy is specified the Gastec standard applies)		Gastec no.	Calibrated (✓)
Hydraulic pressure equipment			N/A
Pressure gauge, when tested pneumatically		100666	✓
Stopwatch			✓
Test Conditions			
Safety precautions:			
- safety rules for high pressures Gastec reference HP1			
- safety rules for use of gas cylinders, reference CP16-3.			
		Complies (✓)	N.A. (✓)
- Test is to be performed before and after the corrosion test:			
- The samples are filled with water and slowly pressurised:			
- The samples surface shows no visible cracks as a result of this test:			
- Retest a new sample with a pressure gauge with accuracy +5% if samples have failed			

Test Results	Requirement				sample no. Co304		sample no.:		Sample no.:	
	1	2	2A	3	before	after	before	after	Before	after
Moment of test	Before/after Corrosion test									
Classification of component*	1	2	2A	3	2	2				
Test pressure (kPa) *	6750	1015	270	6750	1015	1015				
Test time	≥ 10 min				15	15				
Rupture	No				No	No				
Permanent distortion	No				No	No				
Test dated	To be monitored				Jan 02	Jan 03				

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks: IS also in compliance with Regulation 110 annex 5A.		

Job Reference: 122060	Initials: Ken
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File Issue: 002	RESULT SHEET R67-01 LPG EQUIPMENT	GASTEC
Report Number: 122060	EXTERNAL LEAKTIGHTNESS including high and low temperature	Page: RM 2/00

Product:	Dosage Unit Type 30
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Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	5, 6, 7		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Oven	1630	✓	✓
Cooler	020	✓	✓
Pressure gauge	100666	✓	✓
Leakage gauge			
Stopwatch			
Test Conditions			
Safety precautions:			
- safety rules for high temperature, Gastec reference HT1			
- safety rules for high pressures, Gastec reference HP1			
- safety rules for use of gas cylinders, reference CP16-3			
		Complies (✓)	N.A. (✓)
- The sample has conditioned for 8 hours (at least) at the test temperature.		✓	
- The sample is slowly pressurised after the 8 hours of conditioning at the test temperature.		✓	
- The test sample is submerged in the test fluid for at least 60 sec, preferred is 900 sec.		✓	
- When air bumble(s) are detected after 60 sec, leakage is considered to be > 15 cc/h.		✓	

Test Results	Requirement				sample no.: 603004					
Test temperature					room temperature		-65°C / 120°C*		-20°C	
Moment of test	Corrosion / creep / endurance / cycle test				before	after	before	after	before	after
Classification of component	1	2	2A	3	2	2	2	2	2	2
Test pressure (kPa)	4500	675	180	6750	900	900	900	900	900	900
External leakage	< 15cc/h				0	0	0	0	0	0
Test date	To be monitored				Jan 03	Jan 03	Jan 03	Jan 03	Jan 03	Jan 03

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		
is also in compliance with Regulation 110 ANNEX 5B		

* Cross out which is not applicable

Job Reference: 122060	Initials: Km
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File Issue: 002	RESULT SHEET R67-01 LPG EQUIPMENT	GASTEC
Report Number: 122060	EXTERNAL LEAKTIGHTNESS including high and low temperature	Page: RM 3/00

Product:	Dosage Unit type 30
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Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	5, 6, 7		
Testing Equipment (when no accuracy is specified the Gastec standard applies)			
	Gastec no.	Calibrated (✓)	Operation OK (✓)
Oven	163D	✓	✓
Cooler	820	✓	✓
Pressure gauge	100666	✓	✓
Leakage gauge			
Stopwatch			
Test Conditions			
Safety precautions:			
- safety rules for high temperature, Gastec reference HT1			
- safety rules for high pressures, Gastec reference HP1			
- safety rules for use of gas cylinders, reference CP16-3			
		Complies (✓)	N.A. (✓)
- The sample has conditioned for 8 hours (at least) at the test temperature;			
- The sample is slowly pressurised after the 8 hours of conditioning at the test temperature;			
- The test sample is submerged in the test fluid for at least 60 sec, preferred is 900 sec;			
- When air bumble(s) are detected after 60 sec, leakage is considered to be > 15 cc/h.			

Test Results	Requirement				sample no.: C03005					
Test temperature					room temperature	65°C / 120°C *		-20°C		
Moment of test *	Corrosion / endurance / cycle test				before	after	before	after	before	after
Classification of component *	1	2	2A	3	2	2	2	2	2	2
Test pressure (kPa)	4500	675	180	6750	900	900	900	900	900	900
External leakage	< 15cc/h				0	0	0	0	0	0
Test date	To be monitored				Jan 02	Jan 03	Jan 02	Jan 03	Jan 03	Jan 03

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		
is also in compliance with Regulation 110 ANNEX 5B		

* Cross out which is not applicable

Job Reference: 122060	Initials: U
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File Issue: 002	RESULT SHEET R67-01 LPG EQUIPMENT	GASTEC
Report Number: 122060	EXTERNAL LEAKTIGHTNESS including high and low temperature	Page: RM 4/00

Product:	Dosage Unit type 30
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Tested in accordance with:				
Approval requirement:	Regulation 67-01			
Annex:	15			
Article:	5, 6, 7			
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)	
Oven	1638	✓	✓	
Cooler	820	✓	✓	
Pressure gauge	100666	✓	✓	
Leakage gauge				
Stopwatch				
Test Conditions				
Safety precautions:				
- safety rules for high temperature, Gastec reference HT1				
- safety rules for high pressures, Gastec reference HP1				
- safety rules for use of gas cylinders, reference CP16-3				
		Complies (✓)	N.A. (✓)	
- The sample has conditioned for 8 hours (at least) at the test temperature;				
- The sample is slowly pressurised after the 8 hours of conditioning at the test temperature;				
- The test sample is submerged in the test fluid for at least 60 sec. preferred is 900 sec;				
- When air bumble(s) are detected after 60 sec. leakage is considered to be > 15 cc/h.				

Test Results	Requirement	sample no.: 003006					
Test temperature		room temperature		-65°C / 120°C *		-20°C	
Moment of test *	Corrosion / creep / endurance / cycle test	before	after	before	after	before	after
Classification of component *	1 2 2A 3	2	2	2	2	2	2
Test pressure (kPa) *	4500 675 180 6750	900	900	900	900	900	900
External leakage	≤ 15cc/h	0	0	0	0	0	0
Test date	To be monitored	Jan 03	Jan 03	Jan 03	Jan 03	Jan 03	Jan 03

Conclusion	Complies (✓)	N.A. (✓)
Requirement	✓	
Samples meet requirement		
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		
IS also in compliance with Regulation 110 ANNEX 5B		

* Cross out which is not applicable

Job Reference: 122060	Initials: Ker
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File Issue: 002	RESULT SHEET R67-01	GASTEC
	LPG EQUIPMENT	
Report Number: 122060	SEAT LEKKAGE	Page: RM 5/00

Product: Dosage unit

Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	8		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Flow meter (for metal to metal seat only)	1638	✓	✓
Pressure gauge	820	✓	✓
Leakage gauge	100666	✓	✓
Stopwatch			
Test Conditions			
Safety precautions:			
- Safety rules for high pressures Gastec reference HP1			
- Safety rules for use of gas cylinders, reference CP16-3			
		Complies (✓)	N.A. (✓)
- Seat leakage is tested after testing the external leakage:			
- The sample is submerged in water (metal to metal seats excluded) and slowly pressurised:			
- Test is carried out at room temperature			
- The test time is at least 120 sec, preferred is 900 sec:			
- When air bubble(s) are detected after 120 sec, seat leakage is considered to be above the limits (for metal to metal seats leakage shall be less than 500 cch, as indicated below).			

Test Results	Requirement			sample no. 03004		sample no.:		sample no.:	
	0-3000	50-3000	0-2300	before	after	before	after	before	after
Moment of test	Crossed out								
Test pressure (kPa) *	0-3000	50-3000	0-2300	900	900	900			
Seat leakage *	No air bubble(s) / < 500 cch			0	0	0			
Test date	To be monitored			Jan 03	Jan 03				

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		
is also in compliance with Regulation 110 annex 5C		

* Cross out which is not applicable

Job Reference: 122060	Initials: Ken
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File Issue: 002	RESULT SHEET R67-01	GASTEC
	LPG EQUIPMENT	
Report Number: 122060	SEAT LEAKAGE	Page: RM 6/00

Product:	Dosage unit type 30
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Tested in accordance with:				
Approval requirement:	Regulation 67-01			
Annex:	15			
Article:	8			
Testing Equipment (when no accuracy is specified the Gastec standard applies)		Gastec no.	Calibrated (✓)	Operation OK (✓)
Flow meter (for metal to metal seat only)		1630	✓	✓
Pressure gauge		100666	✓	✓
Leakage gauge				
Stopwatch				
Test Conditions				
Safety precautions:				
- Safety rules for high pressures Gastec reference HP1				
- Safety rules for use of gas cylinders, reference CP16-3				
			Complies (✓)	N.A. (✓)
- Seat leakage is tested after testing the external leakage.				
- The sample is submerged in water (metal to metal seats excluded) and slowly pressurised;				
- Test is carried out at room temperature				
- The test time is at least 120 sec, preferred is 900 sec.				
- When air bubble(s) are detected after 120 sec, seat leakage is considered to be above the limits (for metal to metal seats leakage shall be less than 500 cc/h, as indicated below).				

Test Results	Requirement			sample no.: 603006		sample no.:		sample no.:	
	Cycle	Endurance test		before	after	before	after	before	after
Moment of test				900	900				
Test pressure (kPa)	0-3000	50-3000	0-2300						
Seat leakage *	No air bubble(s) < 500 cc/h			0	0				
Test date	To be monitored			Jan 03	Jan 03				

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		

* Cross out which is not applicable

Job Reference: 122060	Initials: <i>km</i>
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File Issue: 002	RESULT SHEET R67-01	GASTEC
	LPG EQUIPMENT	
Report Number: 122060	SEAT LEKKAGE	Page: RM 7/00

Product:	Dosage Unit type 30
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Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	8		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Flow meter (for metal to metal seat only)	1638	✓	✓
Pressure gauge	100666	✓	✓
Leakage gauge			
Stopwatch			
Test Conditions			
<i>Safety precautions:</i>			
- Safety rules for high pressures Gastec reference HP1			
- Safety rules for use of gas cylinders, reference CP16-3			
		Complies (✓)	N.A. (✓)
- Seat leakage is tested after testing the external leakage;			
- The sample is submerged in water (metal to metal seats excluded) and slowly pressurised.			
- Test is carried out at room temperature			
- The test time is at least 120 sec, preferred is 900 sec.			
- When air bumble(s) are detected after 120 sec, seat leakage is considered to be above the limits (for metal to metal seats leakage shall be less than 500 cc/h, as indicated below).			

Test Results	Requirement		sample no. 603005		sample no.:		sample no.:	
	Endurance test		before	after	before	after	before	after
Moment of test	0-3000	50-3000	900	900				
Test pressure (kPa) *	0-2300							
Seat leakage	No air bubble(s) / ≤ 500 cc/h		0	0				
Test date	To be monitored		Jan 03	Jan 03				

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		
After the endurance test, leakage testing is only required at room temperature.		

* Cross out which is not applicable

Job Reference: 122060	Initials: Kar
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File Issue: 002	RESULT SHEET R67-01 LPG EQUIPMENT	GASTEC
Report Number: 122060	CORROSION TESTS (Salt spray)	Page RM 8/00

Product:	Dosage Unit Type 30
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Tested in accordance with:			
Approval requirement:	Regulation 67-01		
Annex:	15		
Article:	12.1		
Task instructions*:	ISO 9227		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Salt spray equipment			
Stopwatch			
Thermometer	100717	✓	✓
Test Conditions			
Safety precautions:-		Complies (✓)	N.A. (✓)
- Before testing the sample is cleaned and dried at ambient temperatures < 40 °C		✓	
- All connections and openings are closed		✓	
- During testing the sodium chloride concentration is 50+5gr/L		✓	
- The average rate of collection of solution is checked (1-2ml/h/80cm ²)		✓	
- After testing the sample is cleaned and dried at ambient temperatures < 40 °C		✓	

Test results	Requirement	Sample no.: C03004	Sample no.:
Date and time starting the test	Timing aspects to be monitored	Jan 03	
Date and time stopping the test	Timing aspects to be monitored	Jan 03	
Salt spray testing time:	144 h	144	
Ambient temperature during testing	35±2°C	35	
Store time at room temperature	0,5 - 1h	1	
Test to be performed after the endurance test are:			
Hydrostatic strength	According to 15.4	See page RM: 1.00	See page RM:
External leakage at ambient, low and high temp	According to 15.5, 15.6 and 15.7	See page RM: 2.00	See page RM:

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		

Job Reference: 122060	Initials: K
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File Issue: 002	RESULT SHEET R110 CNG EQUIPMENT	GASTEC
Report Number: 122060	VIBRATION RESISTANCE TESTS	Page RM 9/00

Product: **Dosage unit type 30**

Tested in accordance with:			
Approval requirement:	Regulation 110		
Annex:	5N		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Resonance equipment	000599	NA	✓
Test Conditions			
Safety precautions:-		Complies (✓)	N.A. (✓)
Component shall be vibrated for 2 hours at 17Hz with amplitude 1.5 mm		✓	✓
Resonance test are carried out along each of three orthogonal axes		✓	

Test results	Sample no. 122060	Sample no.:
External leakage test annex 5B (additional)	see RM 4/00	see RM
Internal leakage test annex 5C	see RM 6/00	see RM
Visual inspection after test	no mechanical failures	OK
Test date	to be monitored	Jan 03

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meets requirement	✓	
Remarks:		

Job Reference: 122060	Initials: Ko
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File Issue: 002	RESULT SHEET R110	GASTEC
	CNG EQUIPMENT	
Report Number: 122060	DURABILITY TEST	Page: RM 10/00

Product: **Dosage unit**

Tested in accordance with:

Approval requirement:	Regulation 110		
Annex:	5L		
Testing Equipment (when no accuracy is specified the Gastec standard applies)	Gastec no.	Calibrated (✓)	Operation OK (✓)
Robot			
Life test device	828	✓	✓
Pressure gauge			
Stopwatch			
Test Conditions			
<i>Safety precautions:</i>			
- safety rules for high pressures Gastec reference HP1			
- safety rules for use of gas cylinders, reference CP16-3			
		Complies (✓)	N.A. (✗)
- The test is performed with a periode of not less then 10 seconds:			
- 96 % of the total cycles is performed at room temperature			
- 2 % of the total cycles is performed at minimum temperature			
- 2 % of the total cycles is performed at maximum temperature			

Test Results	Requirement				sample no.:	sample no.:	sample no.:
	0	1	2	3			
Classification of component.*					2		
Test pressure (kPa)	Wp	Wp	Wp	Wp	450		
Date & time starting the test	To be monitored				Jan 03		
Date & time stopping the test	To be monitored				Jan 03		
Actual cycles performed	Test cycles > 6.000 times Test cycles > 20.000 times				20000		
Test to be performed after the endurance test are:							
External leakage	According to annex 5B	See RM 3/00	See RM	See RM			
Seat leakage	According to annex 5C	See RM 7/00	See RM	See RM			

Conclusion		
Requirement	Complies (✓)	N.A. (✓)
Samples meet requirement	✓	
Remarks:		

- * Cross out which is not applicable
- wp = working pressure = **450 kPa**

Job Reference: 122060	Initials: Kan
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