PREFACE

Since there is no internationally established standard for fire pump products for the time being, fire pump standards of those technically advanced foreign countries differ significantly in terms of their contents and requirements. Thus, this STANDARD, with reference to the fire pump standards of some foreign countries, is emendated as per the actual situations in China in fire pump manufacturing and application.

This STANDARD updates the previous Standard, the *Performance Requirements and Test Methods of Vehicle-mounted Fire Pumps*, and in addition, it expands the applicable scope to stand-alone fire pumps. Compared with the previous version, the main changes in this amended STANDARD are as follows: this STANDARD is prepared and amended according to the stipulations in GB/T1.1–1993; the applicable scope expands from vehicle-mounted fire pump to stand-alone fire pump; this STANDARD is supplemented with the performance requirements and test methods for high pressure, high-low pressure, medium pressure and medium-low pressure vehicle-mounted fire pumps and fire pump groups; the numbering rules of the models are unified; after multitude of discussions and harmonization, the dividing definitions for medium pressure pump and low pressure pump are set out; it is stipulated that the vibration requirement must comply with Standard JB/T8097-95; the water-pressure test method was revised; the test method of continuous operation of a priming device was introduced.

The fire pump or vehicle-mounted fire pump standards compiled with the reference to this *Performance Requirements and Test Methods of vehicle-mounted Fire Pump Standard* should be implemented with, and subject to, the revised edition.

This STANDARD replaces the GB6245 – 86 Standard on and from the date when it becomes effective.
This STANDARD is proposed by the Public Security Bureau of People's Republic of China.
This STANDARD is governed and maintained by the 4th Sub-committee of the National Technical Committee for Standardization of Fire-Fighting Products.
This STANDARD is drafted by: Shanghai Fire-fighting Science Research Institute under the Ministry of Public Security.

This STANDARD was first issued in: April of 1986.
This STANDARD was first revised in: July of 1998.

National Standard of the People's Republic of China

GB 6245-1998

In substitute for GB 6245-86

Performance Requirements and Test Methods for Fire Pumps

1. Scope

This STANDARD stipulates the performance requirements, test method and inspection regulation, etc. for the fire pumps, including the fire water-pump and fire pump group (hereinafter referred to as pump group).

This STANDARD applies to those fire pumps or pump groups using water as the main extinguishant, such as the vehicle-mounted fire pump, the fixed fire pump, etc.

This STANDARD is not applicable for the boat-mounted fire pumps, portable fire pumps and mini vehicle fire pumps.

2. References

Certain clauses contained in the following Standards are quoted in this STANDARD as the standard clauses. All specified editions are valid as of the date of the publication of this STANDARD. All Standards are subject to further amendments, and each party using this STANDARD shall discuss the possibility of using the latest edition of these Standards.

GB/T 3214－91 *Measurement Method of Water Pump Flow*
GB 3216－89 *Test Method of Centrifugal Pump, Mixed-flow Pump, Axial Pump and Turbulence Pump*
GB 3797－89 *Electrical Control Device, Part Two: Electrical Control Device Equipped With Electronic Apparatus*
GB 4720－84 *Electrical Control Device, Part One: Electrical Control Device of Low Voltage Electrical Appliance*
JB/T 8097－95 *Pump's Vibration Measurement and Evaluation Method*

3. Definitions

The following definitions shall apply in this STANDARD.

3.1 Vehicle-mounted Fire pump

It is installed on the chassis of fire vehicles.

3.2 Priming Time

It is the period of time from the priming device starts working to the output pressure meter displays the pressure.

3.3 Depth of water-suction

It is the depth difference between the basic level of the pump and the water level. Unit: m.

3.4 Low Pressure Pump

It means that the fire pump's rated working pressure does not exceed 1.3Mpa.

3.5 Medium Pressure Pump

It means that the fire pump's rated working pressure is between 1.4～2.5Mpa.

3.6 Medium-low Pressure Pump

It means that the fire pump can supply both medium pressure and low pressure.

3.7 High Pressure Pump

It means that the fire pump's rated working pressure is no lower than 3.5Mpa.

3.8 High-low Pressure Pump

It means that the fire pump can supply both high pressure and low pressure.

3.9 Working Condition in Both High and Low Pressure

It means that the working condition of the pump simultaneously supplies both high and low pressure.

3.10 Working Condition in Both Medium and Low Pressure

It means that the working condition of the pump simultaneously supplies both medium and low pressure.

This STANDARD is approved by the China State Bureau of Quality and Technical Supervision on July 15, **1998** and has been implemented since **July 1, 1999**.

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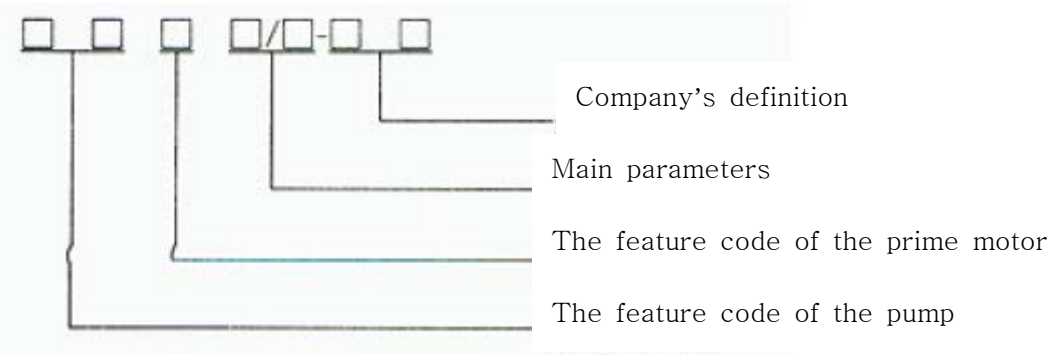
4. Model

4.1 The product model consists of three parts: pump character code, engine character code and main criteria. Its formula is as below:



4.2 Table 1 shows the denotation method of the pump character code.

4.3 Table 2 shows the denotation method of the engine character code.

4.4 Table 3 shows the denotation method and its unit of the main parameters, which is illustrated in the unit of 10 times the rating pressure and rating flow.

4.5 Examples of Model

a) Low pressure pump, rating-pressure 1.0Mpa, rating-flow 25 L/s. Its model is XB/10/25.

b) Low pressure fire pump group powered by electric motor, rating pressure 1.0Mpa, rating flow 30 L/s. Its model is XBD10/30.

c) High-low pressure fire pump group powered by diesel engine, rating high-pressure 4.0Mpa, rating low pressure 1.0Mpa, rating flow 6 L/s in high-pressure and 40 L/s in low-pressure. Its model is XBC40 • 10/6 • 40.

Pump's character	Code
Fire pump	
Vehicle-mounted fire pump	

Engine character	Code
Electric motor	
Gas engine	
Diesel engine	

	Main parameter	Unit
High-low pressure	High pressure • low pressure/flow in high	

	pressure • flux in low pressure	
Medium-low pressure	Medium pressure • low pressure/flow in medium pressure • flux in low pressure	
Low, medium and high pressure	Pressure/flow	

5. Performance Requirements

5.1 Main Technical Parameter

5.1.1The pump capability test should be carried out according to Clause 6.8. The test result of the vehicle-mounted fire pump should comply with the stipulation in Table 4, and that of the pump group should comply with that in Table 5.

5.1.2 The low pressure vehicle-mounted fire pump should comply with the stipulation in Clauses 5.1.2.1～5.1.2.3.

5.1.2.1 Working condition 1: When the water-drawing depth is 3m, it should comply with the requirement of rating flow (Qn) and rating pressure (Pn).

5.1.2.2 Working condition 2: When the water-drawing depth is 3m and the flow is 0.7 Qn, the working pressure should be no less than 1.3 Pn.

5.1.2.3 Working condition 3: When the water-drawing depth is 7m and the flow is 0.5 Qn, the working pressure should be no less than 1.0 Pn.

5.1.3 The medium pressure vehicle-mounted fire pump should comply with the stipulation in Clauses 5.1.3.1～5.1.3.2.

5.1.3.1 Working condition 1: When the water-drawing depth is 3m, it should comply with the requirement of rating flow (Qnz) and rating pressure (Pnz).

5.1.3.2 Working condition 2: When the water-drawing depth is 7m and the flow is 0.5 Qnz, the working pressure should be no less than 1.0 Pnz.

5.1.4 The high pressure vehicle-mounted fire pump should comply with the stipulation in Clauses 5.1.4.1～5.1.4.2.

5.1.4.1 Working condition 1: When the water-drawing depth is 3m, it should comply with the requirement of rating flow (Qng) and rating pressure (Png).

5.1.4.2 Working condition 2: When the water-drawing depth is 7m and the flow is 0.5 Qng, the working pressure should be no less than 1.0 Png.

5.1.5 The medium-low pressure vehicle-mounted fire pump should comply with the stipulation in Clauses 5.1.5.1～5.1.5.4.

5.1.5.1 Working condition 1: When the water-drawing depth is 3m, it should comply with the requirement of rating flow (Qn) and rating pressure (Pn).

5.1.5.2 Working condition 2: When the water-drawing depth is 3m and the flow is 0.5 Qn, the working pressure should be no less than 1.8 MPa.

5.1.5.3 Working condition 3: When the water-drawing depth is 7m and the flow is 0.5 Qn, the working pressure should be no less than 1.0 Pn.

5.1.5.4The medium-low pressure vehicle-mounted fire pump should be available to the working condition in both medium and low pressure, excluding the high-low pressure fire pump with medium-low pressure capability.

5.1.6 The high-low pressure vehicle-mounted fire pump should comply with the stipulation in Clauses 5.1.6.1～5.1.6.4.

5.1.6.1 Working condition 1: When the water-drawing depth is 3m, it should comply with the requirement of rating flow (Qn) and rating pressure (Pn).

5.1.6.2 Working condition 2: When the water-drawing depth is 3m, it should comply with the requirement of high pressure rating flow (Qnz) and rating pressure (Pnz).

5.1.6.3 Working condition 3: when the water-drawing depth is 7 m and the flow is 0.5 Qn, the working pressure should be no less than 1.0 Pn.

5.1.6.4 The high-low pressure vehicle-mounted fire pump should be available to the working condition in both high and low pressure.

5.1.7 The fire pump group powered by electric motor should comply with the stipulation in clause 5.1.7.1. The fire pump group powered by an engine should comply with the stipulations in Clause 5.1.7.1 ～5.1.7.2.

5.1.7.1 Working condition 1: When the water-drawing depth is 0 m, it should comply with the requirement of rating flow and rating pressure.

5.1.7.2 Working condition 2: When the water-drawing depth is 6 m and the pressure is the rating pressure, the flow should be no less than 50% of the rating flow.

Table 4

Name		Unit	Code	Rating working condition
Low pressure	Rating flow			
	Rating pressure			
Medium pressure	Rating flow			
	Rating pressure			
High pressure	Rating flow			
	Rating pressure			
water-suction depth				

Table 5

Main parameter	Unit	Code	Rating working condition

Rating flow			
Rating pressure			
water-suction depth			

5.2 Structure Requirement

5.2.1 The tightening and self-locking device should not become loose due to vibration or other reasons.

5.2.2 The arrow for directional use or other obvious instructional signs should be attached to the body of the fire pump.

5.3 Anti-causticity character

The surface of the fire pump, on which chemicals flow , should be proofed against the medium.

The anti-causticity test should be carried out on the surface of the fire pump on which the chemicals flows. After the test no disfigurement, that would affect the fire pump's function, should occur.

5.4 Mechanical Capability

5.4.1The pressurization test of the fire pump should be implemented according to Clause 6.10. During the test, no disfigurement, such as leakage or sweating etc., should occur.

5.4.2The water-pressure test should be implemented on the components of the fire pump, where the liquid flows, according to Clause 6.11. During the test, no disfigurement, such as distortion and cracks etc., which would affect the pump's function, should occur.

5.5 Vacuum and Air-tight Characteristics

The fire pump should possess good vacuum and air-tight characteristics. When the relevant test is carried out according to Clause 6.13, the value of vacuum landing should not exceed 2.6kPa within 1 minute.

5.6 Continuous Operation Characteristic

The continuous operation test of the fire pump must be implemented according to Clause 6.9. During the test, the result must comply with the stipulations in Clauses 5.6.1～5.6.4.

5.6.1The exit pressure of the fire pump should not be lower than the rating exit pressure. The flow should comply with the requirement of the rating flow.

5.6.2 The temperature of the outer surface of the bearing block should not exceed 75℃. The rising scale of temperature should not exceed 35℃.

5.6.3 The seal of the shaft cover should be in good condition. No line-up leakage should occur. The padded seal can be adjusted.

5.6.4 The pump vibration should comply with the stipulation of JB/T 8097 standard.

5.7 Priming device

The priming device should comply with the stipulations in Clauses 5.7.1～5.7.7.

5.7.1 The maximum vacuum coefficient of the priming device of the pump group should be no less than 80kPa. That of the priming device of a vehicle-mounted pump should be no less than 85kPa.

5.7.2 The time consumption test of water-drawing of the fire pump should be implemented according to Clause 6.14. The water-drawing time length must comply with the stipulation in Table 6. The rating flow shown in Table 6 shows the low pressure rating flow when testing the medium-low and high-low pressure fire pump.

Table 6

Rating flow, L/s			
water-suction time, s			

5.7.3 When testing according to Clause 6.15, no failure should occur after the priming device (excluding water-circulating pump) operates continuously for 30 minutes.

5.7.4 When adopting the pressurised water in the pump exit as the divorcing pressure source of the priming device, the divorcing pressure should not exceed 0.25Mpa.

5.7.5 The structure of the priming device should be accessible for maintenance and repair.

5.7.6 The storage of the lubricant should meet the demands of a water-drawing operation for five continuous times.

5.7.7 Freezing prevention measures should be adopted for the water-circulating pump.

5.8 When the foam-proportion mixer is installed in the fire pump, no less than two kinds of foam liquid should be available for use.

5.9 Pressure Stabilization Valve

When the pressure stabilization valve is installed in the fire pump, the opening pressure of the pressure stabilization valve should not exceed 0.25Mpa as stipulated.

5.10 Pump Group

5.10.1The pumps used by the pump group should pass the design-finalization test and the formula test and should comply with the stipulation of this standard and other relevant standards.

5.10.2 The engine used should pass the design-finalization test and comply with the relevant standards.

5.10.3 The engine should possess good start-up characteristics under room temperature, ensuring a smooth start-up within 5 seconds and no longer than 20 seconds after the water-drawing procedure is completed, to ensure the fire pump reaches the rating working condition.

5.10.4 The capability test of the pump group should be implemented according to Clause 6.8, the result of which should comply with the stipulation in Clause 5.1.

5.10.5 The continuous operation test of the pump group should be implemented according to Clause 6.9, the result of which should comply with Clause 5.6, moreover, the engine and power output device should comply with the following requirements:

a) It operates normally and no leakage of water and oil occurs.

b) The temperature of outflow water from the engine and that of the machine oil should comply with the stipulation requirement.

c) The lubricant temperature of the power output should be lower than the maximum permitted working temperature.

d) The temperature of the output bearing block of the power output device should not exceed 100℃.

e) The electric working voltage, working current and temperature of the bearing block should be within the allowed working scope.

5.10.6 The over-loading test of the pump group powered by the engine as its power supplier should be implemented for a period of 10 minutes. During the test, the pump group should operate normally, and no excess vibration and leakage of oil and water should occur.

5.11 Control and Instrument Inspection System

5.11.1The direction board should be set up for the control handbrake of the pump and pump group.

5.11.2 All the control buttons should be convenient and reliable.

5.11.3 The instrument inspection system should be installed in the pump group and placed in such a location that it can be easily observed and controlled.

5.11.3.1 The pump should be equipped with the following instruments:

a) Pressure meter for the fire pump

b) Vacuum meter for the fire pump. The precision of the above=mentioned instruments should not be lower than 2.5 degrees.

5.11.3.2 The pump group powered by the engine should also be equipped with the following instruments:

a) Oil pressure meter.

b) Water temperature meter.

c) Gas or diesel level indicator.

d) Current meter.

e) Rotation speed meter of fire pump.

5.11.3.3 The pump group powered by the electric motor should also be equipped with the following instruments:

a) Current meter

b) Voltage meter

c) Rotation speed meter for the fire pump (adapted to frequency-adjustable motor).

5.12 Electrical Control Equipment

The electrical control equipment should comply with the requirement of GB 3797 or GB 4720.

6. Test Method

6.1 Test Environmental Condition

The test should be carried out under standard atmospheric pressure conditions with a water temperature of 20℃. When the atmospheric pressure is different from the standard atmospheric pressure and the water temperature is not 20℃, the water-drawing depth and the vacuum rate of the priming device should be adjusted accordingly.

6.1.1 Modification formula of water-drawing depth

In this formula: Hsz——adjusted water-drawing depth, m;

H’ sz—— the water-drawing depth for testing stipulated in this standard, m;;

Pb—— the atmospheric pressure at the test site, Pa;

P—— the boil-off pressure at actual water temperature, Pa;

ρ —— the density of liquid-supplying, kg / m3;

g—— the acceleration of gravity, m / s2.

6.1.2 Modification formula of vacuum of priming device

In this formula: Pz——the adjusted vacuum rate, kPa;

P’ z——the actually measured vacuum rate in test, kPa.

6.2 Liquid Used in the Test

The liquid used in the test should comply with the stipulation in Clause 5.3 of GB 3216-89 standard.

6.3 Test Equipment

The test equipment should comply with the stipulation in Clause 5.4 of GB 3216-89 standard.

6.4 Test Result

The test result should comply with the stipulation in Clause 5.5 of GB 3216-89 standard.

6.5 Tester

The pump should be tested together with the following components:

a) The relevant fittings actually and finally installed on site. The check valve should be installed in the vehicle-mounted pump and the pump powered by the engine;

b) and / or the same duplicates.

The measurements should be implemented according to Clauses 5.7.2 and 5.7.3 of GB 3216-89 standard.

6.5.1The length of sopping-up pipe used in the test equipped with filter should comply with the stipulation of Table 7.

Table 7

water-suction depth	Length of sopping-up pipe

6.6 Measurement Precision

The measurement precision should comply with the stipulation in Clause 5.8 of GB 3216-89 standard.

6.7 Measurement Method of Flow, Pressure and rotation

The measurement method of pressure and rotation should comply with the stipulation of Chapter 6 of GB 3216-89. The measuring point of exit pressure of the vehicle-mounted pump and the pump powered by the engine should be fixed in the outer end of the check valve. The flow measurement should be implemented according to GB/T 3214 standard.

6.7.1 The flow measurement can be carried out by using the squirt gun flow meter (which should be the special squirt gun defined and possessing the measurement precision stipulated in Clause 6.6.) The pump should be connected to the squirt gun flow meter by a piece of fire woven-pipe with liner of 5 m in length.

6.8 Character Test

The relation between the pressure, rotation and flow of the pump is measured via the character test. The test should be implemented in turn firstly from the working condition of minimum power.

The test should be implemented for a sufficient period of time, so as to obtain a coherent result and achieve the expected test precision. Certain intervals should be kept between each time of flow measurement, and measure the flow, pressure and rotation simultaneously. The test result should comply with the stipulation in Clause 5.1.

6.9 Operation Test

6.9.1The low pressure vehicle-mounted pump and the pump powered by the engine should keep operating for 2 hours under working condition 1, and then for another 2 hours under working condition 2. The whole operation should be continuous.

6.9.2 The medium-low pressure pump should keep operating for 2 hours under low pressure working conditions, and then for 1 hour respectively under medium pressure working conditions and under both medium and low pressure working conditions. The whole operation should be continuous.

6.9.3 The high-low pressure pump should keep operating for 2 hours under low pressure working conditions, and then for 1 hour respectively under high pressure working conditions and under both high-and low-pressure working conditions. The whole operation should be continuous.

6.9.4 The pump and pump group except the above-mentioned should keep operation for 4 hours under the rating working conditions.

6.9.5 During the pump operation test, the rise of the bearing block temperature should be checked. From the pump start-up, the temperature of the outer surface of the bearing block should be checked at intervals of 15 minutes. The checks should not stop until the same temperature is measured three times. At the same time, the pump flow, exit pressure and rotation should be measured. The test result should comply with the stipulation of Clause 5.6.

6.10 Pressurization Test

With the pump inlet blocked and the exit valve closed, the pump is pressurized step by step until the maximum pressure reaches 1.1 times the maximum pressure and remains under such pressure for at least 5 minutes. The same pressure can also be generated by the pump itself and reaches 1.1 times the maximum pressure and remains so for 5 minutes. The test result should comply with the stipulation in

Clause 5.4.1.

6.11 Water Pressure Test

With all the entrances of the pump components blocked, where the liquid flows by, the pump components are pressurized step by step until the pressure reaches 1.5 times the maximum working pressure.

The pump should remain under such pressure for 5 minute. The test result should comply with the stipulation in Clause 5.4.2.

6.12 Anti-causticity Test

6.12.1 Before the test starts, the outer pump surface, over which liquid flows , should carefully be washed with warm water. No grease and dirt should be left. Do not use abrasive materials or solvents while washing.

6.12.2 The test solution is mixed with distilled water and sodium chloride, the concentration of which is 10 kg/m3±1 kg/m3. The pump is filled with such solution inside and remains within a temperature of 35℃±2℃ . After 8 hours, all the water is discharged and the pump is left under such condition for 16 hours. The same cycle should be repeated 5 times.

6.12.3 When the test is finished, the solution should be discharged completely. The surfaces over which liquid flowed should be washed with warm water. The causticity condition should be examined carefully. The test result should comply with the stipulation in Clause 5.3.

6.12.4 The above-mentioned test need not to be implemented on such pumps, the bodies of which have been made of cast iron, cast aluminum or cast copper. The parts where liquid flows over are made of an anti-causticity material, such as stainless steel, bronze or aluminum alloy etc.

6.13 Vacuum and Pressurization Test

6.13.1 When testing, the pump is connected with the standard sopping-up pipe, the length of which should comply with the stipulation in Clause 6.5.1.

6.13.2 The operator should discharge all the remaining water in the pipe and block off the pipe inlet to ensure it’s air-tight; close the exit valve and eliminate the air remaining inside the pump and sopping-up pipe to the maximum vacuum rate, and then close the priming device immediately, measuring the falling scale of vacuum rate within 1 minute. The test result should comply with the stipulation in Clause 5.5.

6.14 water-suction Time Consumption Test

When the water-drawing time consumption test starts on the test desk, the pump should be connected with the standard sopping-up pipe equipped with filter, the length of which should comply with the stipulation of Clause 6.5.1. The water-drawing depth is 7 m for the vehicle-mounted pump, 6 m for the pump group. The test times should not be less than 3 times. The test result should comply with the stipulation in Clause 5.7.2.

6.15 Test of Continuous Operation of Priming device

The vacuum meter of Grade 0.4 is installed at the inlet of the priming device. The control valve of the lubricant supply is set at the proper position. Adjust the rotation to ensure the vacuum rate reaches the required value. Use the cubage method to measure the lubricant flow. Observe and record the vacuum rate, lubricant flow and the temperature of the bearing block, the body near the shaft cover and the middle position of the outer device body at intervals of 5 minutes. The test result should comply with the stipulation in Clause 5.7.

6.16 Over-loading Test

When the water-drawing depth of the pump group is 3 m, adjust the engine gun and pump exit valve to ensure the pump flow is maintained at the rating flow and the pump pressure remains at 1.1 times the rating pressure. The pump should keep operating for 10 minutes. The test result should comply with the stipulation in Clause 5.10.6.

6.17 Engine Start-up Test Under Room Temperature

The engine start-up test is implemented under a room temperature of (5℃～35℃), started according to the engine operation regulations. The start-up time is calculated from pressing down the start-up button to releasing the button after the engine maintains a stable and slow speed. After the engine runs at a stable speed, quickly adjust the engine gun and pump exit valve, making the pump reach the rating working condition as soon as possible and record the duration between the engine acceleration and the pump reaching the rating working condition. Stop the pump after the test is completed. The second round of tests should not re-start until a 2-minute interval elapses. The results of two tests out of three at least should comply with the stipulation in Clause 5.10.3.

7. Inspection Rule

7.1 Inspection Classification

7.1.1 Model Inspection

The model test should be implemented under the following situations. The sample used in model inspection is one set.

a) When the new product needs to be authenticated or the existing product transfers to other product;

b) After normal production starts, great changes take place in raw material, craftwork and design.

7.1.2 Ex-works Inspection

The pump should not be dispatched until it passes each step of inspection by the factory inspection department and is given the quality product certificate.

7.2 Inspection Item

7.2.1The content of the model inspection consists of all the items stipulated in this standard. All the test result should comply with the standard stipulation

7.2.2 The ex-works inspection should be implemented not only according to the requirement of Clauses 5.2, 5.4, 5.5, 5.7, 5.11, but also for checking whether the various working condition points satisfy the stipulation in Clause 5.1.

During the inspection, so far as one index fails to pass, two types of sample from the same production batch should be re-checked. If after re-checking, one index still fails to pass, the whole production batch should be judged as a disqualified product (i.e. “rejected”).