

# BACA

Boiler Aqua Curatio Apparatu

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*Introduction*

## **SAFETY LOCK for BOILER**

*“In the event of an accident, do not explode the boiler either”*



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## II. INTRODUCTION

*Dear Sir,*

In industrial production, the boiler is widely used because of its economic efficiency. For example: in the food industry for people like: sugar, noodles, milk, wine, cake, . . . or animal feed such as bran, shrimp, fish. . . The and in other industries such as paper, rubber, seafood, wood, garment, textile and dyeing, pharmaceuticals. . . they use a boiler.

Very common but the boiler is a source of extreme danger to human health because when the steam is generated at high temperature and pressure it is easy to spray out if leaking and especially the boiler can explode, causing death to human life, the law strictly regulates all processes from fabrication, inspection to the use of boiler.

Thorough inspection, but the boiler is still explosive, not only for boilers made by skilfully made or unmanaged boiler plants, but the explosion in Bangladesh on July 3, 2017 (at least 10 was killed by a boiler bought from Germany shortly before and was put into use or four months later on November 1, 2017 explosion of a boiler at a thermal power plant in Uttar Pradesh state in northern India at least 26 people were killed and more than 100 injured).

In order to avoid these tragic deaths and the insignificant damage to the spirit and material, **BACA Vietnam Co., Ltd** has successfully researched and applied the boiler explosion protection solution, namely " steam".

When the boiler is equipped with this lock, the manufacturer and the user are no longer concerned with the boiler.

### III. OVERVIEW OF THE BOILER INDUSTRY

More and more boilers are being used in industrial production. For example, in the past people could build a burner for hot smoke to dry wood, rubber, food. . . Direct method, but has now switched to steam drying method indirectly by a lot. Steam circulates in the boiler system, only exothermic to the drying chamber makes the temperature more stable, wood less warped, hot smoke does not come in contact with rubber to avoid the smell of smoke and smoke, Especially food to avoid the toxins brought on by smoke,. . .

It is noteworthy that the boiler is a source of extreme danger to human health. It can be explosive causing a terrible accident. And not just in old, dehumidified or domestic boilers, but even new ones imported from high-tech countries like Germany. . . The And not only explode in small scale factories, poorly industrialized behaviors, not strict discipline, but large scale factories, such as thermal power plants.



*Picture of a boiler using diesel fuel.*

## IV. EXPLODE BOILER

Boilers are dangerous, but because of the great effect it brings, people use more and more; And do not know how to avoid the explosion of the incinerator so most people use illusory or lull themselves by avoiding mention. But the fact remains: the boiler still explodes.

### 1. Basic composition of the boiler

The boiler looks very complicated as shown above, but there are only three basic appliances: fuel, triple and water pumps.



- A boiler is a device that generates heat, by: burning fuel (gas, oil, coal, firewood, ...) to heat the water that is in liquid form converted into steam.

*The steam is brought to the place of use (steam transmission) and is lost heat, condensation condensed into water.*

- Thus, the basic structure of the boiler only:
  - **Fuel burning:** to get heat; For fossil fuels that pollute the environment, appropriate treatment systems are needed.
  - **Baloon:** the place where water is stored for steam.

- **Water pump**: supply water to the balloon, compensate for the steam.

In order to increase the efficiency, usability and safety while using, there are many devices that support the three basic components.

## **2. What is called boiler explosion:**

Extinguish the boiler when the boiler is in use unexpectedly explodes. However, some of the following causes have relatively minor consequences, so in practice they are not called boiler explosions. That is:

➤ Short circuit:

For touching, short circuiting electrical circuits in boilers in fans, water pumps and control devices. . . And, this can be avoided if the electrical safety regulations are complied with.

➤ Sudden fuel fire:

Occur only for gas fired boilers. Unusual combustible fuel can cause explosion in the furnace tube as explosion in the exhaust pipe.

➤ Over pressure: Boiler operation exceeds the specified pressure:

- Breakdown of combustion chamber: occurs in solid fuel boiler; Due to the blowing fan blowing the wind into the combustion chamber too much to escape the chimney to break the insulation of the combustion chamber. However, according to the design, fan pressure is not high so the consequences are not great. Can be said, similar to the tire burst.

- Plumbing: at the point of defects such as swelling, cracking, . . . Unstable pressure can also cause cisterns or explosions, also known as pipe bursts, but are just small explosions.
- Breakdown of equipment: Due to malfunction, the boiler is operating at over pressure but does not stop, the furnace goes up high, the safety valve opens and possibly overloaded equipment such as the manometer is destroyed in advance.

When the boiler is working, there is a particular cause. The "Water evaporates too quickly" can break up the baloon (*Destructive baloon texture*), accompanied by loud explosions and terrible calamities. This incident, it is called the boiler burst.

### **3. Causes of boiler explosion:**

Due to incorrect understanding of the cause of explosion, it is not easy to find out how to solve the problem.

Many people mistakenly think that the boiler is burnt due to corrosion, corrosion or damage to safety devices such as valves or water, temperature, pressure rise. . . All are not the main cause. Boiling water, the boiler is just a block of steel, burning to incinerate can not explode. Scale deposits, corrosion also just smelt, explode, occlusion. Temperature, pressure rise, destroying other equipment before, not to break the baloon!

**So, why boiler explosion? Answer: the boiler has run out of water that pumped water. Only this reason can cause explosion.**


Liquid or solid substances usually occupy very small volumes; But when it comes to air, it occupies a very large volume. For example: explosives have a very small volume when a fire reaction occurs that generates too much gas. But to get the

explosion needed another factor is the speed must be fast. Only in cases where the gas generates too much and is so fast that it creates a very high pressure area, breaking the casings, pushing the surrounding atmosphere away, causing the explosion.

Similarly, the boiler is **overheated** due to the low water content of the water that **has been injected with the dangerous amount of liquid** that has passed from the liquid to the steam too quickly (volume increased 1245 times). This amount of steam is trapped in the boiler, creating hundreds of bar pressure, breaking the boiler and exploding like bombs. Do not trust the safety valves because at such high pressure, The steam does not escape in time! And at this pressure, all the equipment in the boiler becomes fragile, which can be broken down immediately, rather than in the order of preference, breaking off slowly and exiting as if the boiler was activated over pressure!

#### **4. Some of the boilers will explode in 2017:**

Boilers have exploded too much, but no one has reported how dangerous the disaster is, which is usually seen only in newsletters with preliminary damage to people and property. And here's just one and a typical explosion in the past year.

 July 03<sup>rd</sup> 2017, The boiler explosion in Bangladesh: at least 10 people died, 50 injured (<https://www.tienphong.vn/the-gioi/no-noi-hoi-tai-nha-may-may-it-nhat-10-nguoi-thiet-mang-1164268.tpo>)

According to Reuters, the incident took place at a Bangladeshi-owned garment factory called Multifabs Limited, one of the largest garment manufacturers in the world.

The plant's boiler suddenly exploded on the evening of July 3, 2017, causing the six-storey building to shake, the walls and the roofs of some areas collapsed.



*Removal of boiler explosion site in Bangladesh, evening 03-7-2017.*

"Nine people were killed at the scene and another died in the hospital," Fire Chiefs said. About 50 injured are currently being treated at the hospital.

*The boiler was bought from Germany shortly before and was put into use.*

Mr. Mesba Faruqui, CEO the garment factory, said the incident was an accident because the boiler was running smoothly for an hour and exploded. (Minh Hanh: Reuters, Aljazeera)

✚ 01-11-2017, The boiler explosion in India: 26 people died, 100 injured (<http://www.nhandan.com.vn/thegioi/tintuc/item/34583602-no-nha-may-dien-o-an-do-lam-26-nguoi-chet.html>)

Excerpted from Electronic People, Source:

The explosion has left at least 26 people dead and more than 100 injured. Victims of injuries have been hospitalized in several state hospitals. Arvind Kumar, Minister of Housing in

Uttar Pradesh, said the death toll could increase in the coming days due to the severity of some people being seriously wounded.



*Smoke from the boiler explosion in India, 01-11-2017.*

The NTPC says the power plant in Unchahar began generating electricity in 1988 with five turbines, each with a capacity of 210 MW. The sixth unit with a capacity of 500 MW, the same machine that just crashed, was only put into operation from April this year. (Based on Reuters, Chinese).

##### **5. Circumstances arise of "Safety lock for boiler":**

Boilers have become more widely used, but boiler explosion problems have weighed heavily on the conscience of technical workers in the boiler industry.

Any boiler can blow up even those produced in high tech countries such as Germany, USA, . . . due to operational errors

including very large and regulated companies such as power plants; and, consequently, the explosion of the boiler is great, especially human life.

Constantly looking for and crashing pain when heard the news of explosion, the author has thoroughly investigated the cause and find a solution explosion boiler success. These are: "Safety lock"

## **6. Explosion-Proof Boiler solution: "Safety Lock":**

Boilers only explosion when an incident occurs, meeting both elements:

- The boiler is overheated when dry.
- the amount of water injected into the boiler is dangerous.

Operators often do not calculate accurately so it is not known how much the boiler is overheated and where the amount of water injected is dangerous. In the operating manual, one emphasizes: "When the boiler is dry, it is forbidden to pump water into the boiler".

Despite the fact that it is strictly prohibited, the practice is still in violation, not only in small companies; there is a lack of industrial behavior but sometimes in large companies like power plants in India; and the boiler still exploded with catastrophic consequences.

So, pointing out that the ban was in fact not sufficiently effective but another effective alternative was needed. Therefore, the author has created a smart locking device, when the boiler is in danger, the boiler is locked automatically; Only when the kilns pass the dangerous state will the lock switch automatically open, the boiler will continue to work.

## V. SAFETY LOCK FOR BOILER

### 1. Technical requirements of "Safety lock":

Incidents of explosion caused very serious consequences so many people when known to expect the solution "Safety Lock". As a result, the subjectivity increases as the boiler can not explode. Therefore, safety lock is both fun and responsible for the author. Should the safety lock must work well, stable, no problems will affect the locking performance.

Specifically, the safety lock is made to be stable on:

#### a. *Functionality:*

Safety locks always work when both elements are overheated and water is injected into the boiler at a dangerous level. Thus, when only one factor occurs, the boiler is still functioning normally. For example: when the boiler is hot enough water, the boiler is still working or in the preparation phase, dry water pump is still working normally.

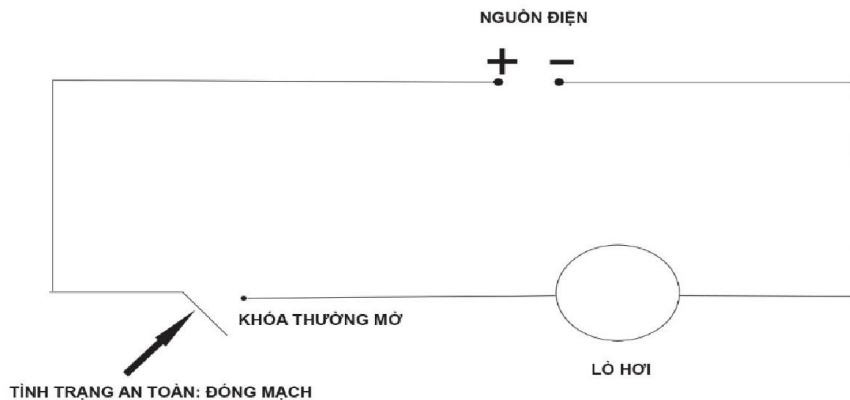
#### b. *Product quality:*

Target quality of safety lock to ensure stable operation, no trouble. Therefore, locking the boiler does not depend on motion because it can be jammed or the circuit may be faulty. . . It can only be based on heat source and material nature (thermal expansion).

### 2. Operating principle of "Safety lock":

To avoid potential trouble, the boiler is in danger. The safety lock does not work, the author has switched to a passive state: "The circuit is open" - the circuit is interrupted, not to operate the boiler. Only when the boiler is in a safe state (the *safety*

light is on) the lock is opened for the boiler operation. If both factors are met, the boiler is overheated and the water is in a dangerous state, the boiler closes and the boiler stops working, unable to intervene (the *hazard* lights are illuminated) until The boiler is returned to the safety state (the safety light is on)



### CẤU TẠO KHÓA LÒ HƠI

#### 3. Scope of safe use:

Encourage the use of safety locks in all boilers, including boilers and superheated boilers; irrespective of the use of fuels such as electricity, gas, oil, coal, firewood or other utilitarian substances, . . .

Not used for other non-boiler types such as oil heaters, kilns, hot smoke dryers. . .

#### 4. Effective use of safety lock:

When using the Safety Lock, the boiler is fully protected from the blast failure; That is, the boiler can not be detonated and hence, the safety lock is also known as the boiler-proof boiler.

With no risk of explosion, manager, operators and people around the boiler area can be relieved, without the tension of explosion hazard.

## 5. Verification of explosion-proof capability:

Boiler equipped Are the safety locks firmly unbreakable? Do you have to wait until the blast to find out if the blast is explosive? That's not true. We can verify to know which boiler is at risk of explosion, explosion-proof boiler!

First of all, we make the boiler too hot by: For normal operation of the boiler for about 2 hours, turn off the water pump to not pump water and open the bottom exhaust valve continuously to the water in the boiler outlet: boiler is dry and excessive heat.

If the stove is stopped, turn off the power supply for the stove, turn off the horn, and the lights.

Turn off the water valve and open the water pump in the "Man" mode:

- Other boiler: the pump works. If we do not lock the valve, the water is pumped into the boiler, very dangerous can cause explosion: due to the water pump in the boiler too hot, too vaporized too high pressure, causing explosion (when the boiler is dry and excessive heat, it is forbidden to pump water into the boiler).
- Boiler fitted Safety locks: the entire circuit is disconnected, only the hazard light is on and the pump can not be operated, regardless of operation; The boiler is cooled down, and the boiler is protected from explosion.

## 6. Customers have used:

- ✚ Nam Hoa Phat medical equipment Co. Ltd, HCMC, Vietnam  
Tax code: 03 0542 8505, Boiler installed in HCMC
- ✚ Sac Cau Vong JSC, Binh Phuoc Province, Vietnam  
Tax code: 38 0104 5720, Boiler installed in Binh Phuoc Province

- ✚ Yen Khue Production Trading Service Co., Ltd, HCMC, Vietnam  
Tax code: 03 1253 6276, Boiler installed in Quang Tri Province
- ✚ Duc Hien Quang Tri Co., Ltd, Quang Tri Province, Vietnam  
Tax code: 32 0015 3129, Boiler installed in Vientiane, Laos
- ✚ Dai Nam wheat Co., Ltd, Vinh Long Province, Vietnam  
Tax code: 15 0105 5629, Boiler installed in Vinh Long
- ✚ Hung Thinh Fertilizer Import and Export JSC, Long An Province, Vietnam  
Tax code: 11 0149 6227, Boiler installed in Long An

## VI. CONCLUDE

With the solution safe lock for boiler, BACA Vietnam Co., Ltd help you avoid the risk of boiler explosion, avoid huge losses of people and property; And above all: no worries using the boiler.

Please call: **090 643 0726** (Nguyen Tan Loc).

Or send an email to: **[Locsaigon@gmail.com](mailto:Locsaigon@gmail.com)**