

## BILLIONFOLD PROOFED TECHNOLOGY

Since their introduction in the 1970's the JOB Thermo Bulbs have become the standard heat responsive glass bulbs for the fire sprinkler industry. Due to their high quality and reliability more than 2 billion JOB Thermo Bulbs are already installed worldwide by all major sprinkler manufacturers for service in fire protection and life safety.

The JOB Thermo Bulb was quickly considered not only as a functional element but also as an aesthetically pleasing component, allowing the sprinkler industry to adjust sprinkler designs in accordance with decorative requirements. JOB continuously develops smaller and faster Thermo Bulbs retaining the superior features of previous designs thus meeting all requirements of effective life safety.



## PRODUCT DESCRIPTION

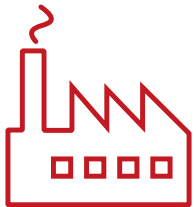
JOB Thermo Bulbs are thermally actuated release elements for automatic sprinklers, smoke vents, fire dampers and other release devices. A hermetically sealed liquid (G or F-type) in the glass bulb expands with rising temperature breaking the bulb into small fragments at a predetermined release temperature.

The unique bone shape design of JOB Thermo Bulbs (US patent No. 4,796,710 and other international patents) combined with the special liquid (F-type; US patent No. 4,938,294) are decisive factors for the outstanding thermal response performance and strength of the glass bulbs. All the main features of JOB Thermo Bulbs can be taken from the chart in the inside.



## FIELDS OF APPLICATION

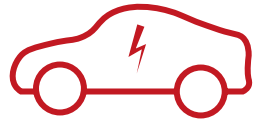
INDUSTRY



CRUISE SHIPS



AUTOMOTIVE



OFFICE



## THE QUALITY

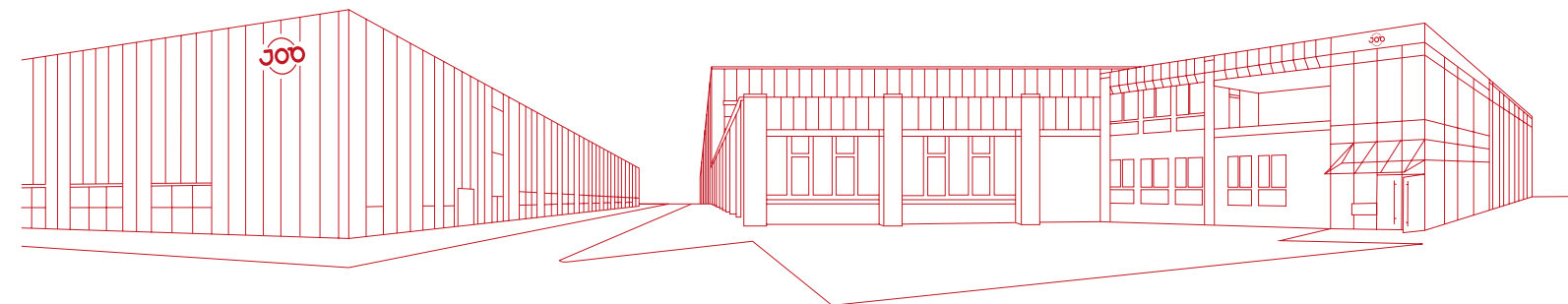
JOB Thermo Bulbs are produced to stringent in-house quality standards under the latest version of ISO 9001 to meet all requirements of approval authorities worldwide, e.g.:

- UL (Underwriters Laboratories INC.)
- FM Approvals (Factory Mutual Approvals)
- LPCB (Loss Prevention Certification Board)
- VdS (VdS Schadenverhütung GmbH)
- TFRI (P. R. China)
- KENTEI (Japan)
- KFI (Korea)



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# JOB THERMO BULBS SPRINKLER GLASS BULBS



Simply. More. Safety.



# THERMO BULBS FEATURES

## DESIGN FLEXIBILITY:

JOB uses its self-drawn glass tubes. This offers huge flexibility for glass bulbs with different length, diameter combinations in order to fulfill strength and response time specifications towards customer demands.

## OPERATING TEMPERATURES:

The different colors of the fluid in the JOB Thermo Bulbs signify different operating temperatures. The bulb coloring complies with all national and international standards for color/temperature ratings, e.g.: UL 199, FM, TFRI, EN 12259-1 and ISO 6182:1.

## MARKING:

In order to guarantee a 100% forward-backward traceability, JOB invented the marking process. Each individual JOB Thermo Bulb is marked with the type and individual batch number. Each batch can be traced back to the raw material as well as to the test data obtained during the manufacturing and quality procedures.



# RESPONSE TIME INDEX RTI

The Response Time Index is a calculated figure describing the actual operating time of a glass bulb mounted in a sprinkler or other devices in given standard conditions. The RTI is an indication of the thermal sensitivity of the glass bulb. The lower the value of the RTI, the faster the response time of the bulb. JOB Thermo Bulbs are able to meet RTI requirements the user may have by combining different actuating liquids with various bulb diameters. Each Thermo Bulb can be identified regarding its response time by the type classification marked on the bulb.

## STANDARD RESPONSE APPLICATIONS RTI >80:

JOB Thermo Bulbs G5 are used for all products requiring standard response functional properties as defined by local agencies or authorities in the USA, Europe and Asia.

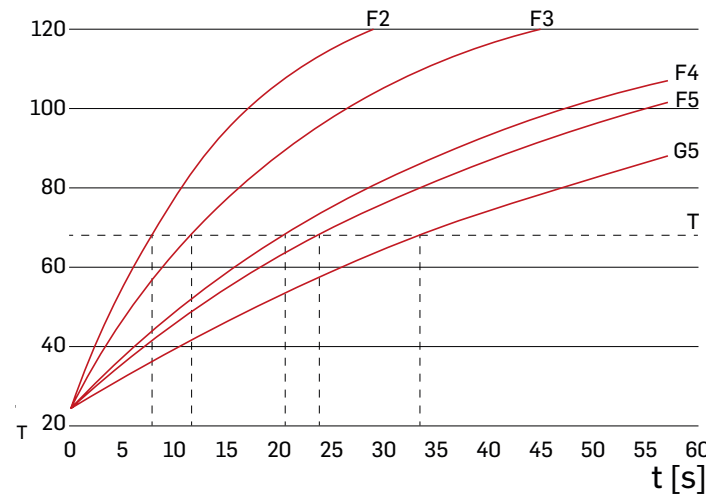
## SPECIAL RESPONSE APPLICATIONS 80>RTI>50:

JOB Thermo Bulbs F5 and F4 are used for applications where insurers hazard classifications require sprinklers, which have an average RTI between 50 and 80.

## FAST, SUPER FAST AND ULTRA FAST RESPONSE APPLICATIONS RTI <50:

JOB Thermo Bulbs F3 and F3-SP are used for applications where products are used for life safety e.g.: residential sprinklers and in cases where insurers hazard classifications require fast response sprinklers. The super fast and ultra fast bulbs F3-F, F2.5, F2 and F1.5 are especially for use in high performance products where a very early activation is essential, such as ESFR sprinklers or water mist products.

## GRAFICAL COMPARISON OF RTI VALUES: TESTED UNDER UL CONDITIONS



RTI = Response Time Index [(m s)<sup>1/2</sup>]  
 $t_r$  = actual response time of thermal release element [s]  
 $u$  = actual gas velocity in the test section of the windtunnel [m/s]  
 $T_{sw}$  = mean liquid bath operating temperature of sensitive detector element [°C]  
 $T_g$  = actual gas temperature in test section [°C]  
 $T_a$  = ambient air temperature during test [°C]  
 $C$  = Conductivity Factor [(m/s)<sup>1/2</sup>]  
 UL Conditions: 135°C at 2,54 m/s

$$RTI = \frac{(-t_r - \sqrt{u})}{\ln \left[ 1 - \frac{(T_{sw} - T_g) \left(1 + \frac{C}{\sqrt{u}}\right)}{T_g - T_a} \right]} \left(1 + \frac{C}{\sqrt{u}}\right)$$

Type	tR [s]
F2	7,3
F3	11,4
F4	20,6
F5	23,8
G5	33,3

	Type	Length	RTI*		Strength				Temperature							Type comp. listed**
			Response Time Index		Average crush load		Lower tolerance limit	Additional temperatures available								
Response		mm	ms <sup>1/2</sup>	fts <sup>1/2</sup>	kN	lbs	kN	lbs	57°C 135°F orange	68°C 155°F red	79°C 175°F yellow	93°C 200°F green	141°C 286°F blue	182°C 360°F mauve	260°C 500°F black	
Standard	G5	16/20	90	163	4,0	880	2,5	550								UL, VdS, LPCB
	G5-XS	16/20	90	163	5,5	1210	4,0	880								UL
Inter-mediate	F5	16/20	68	123	4,0	880	2,5	550								TFRI
	F4	16/20	58	105	4,0	880	2,5	550								UL
Fast	F3-SP	20	32	58	4,1	900	2,3	500								UL, LPCB
	F3	16/20	32	58	3,5	770	2,0	440								UL, TFRI, LPCB
	F3-XS	16/20	32	58	4,5	990	3,0	660								UL
Super Fast	F3-F	16/20	24	43	4,1	900	2,3	500								UL
	F2.5	16/20	24	43	2,5	550	1,25	275								UL, TFRI
	F2.5-XS	16	24	43	4,0	880	2,1	460								
	F2	16	19	34	2,0	440	1,0	220								UL, TFRI
Ultra	F1.5	16	14	25	1,0	220	0,5	110								

More details and other temperature ranges are available on request.  
 \* tested in a test fixture: c=0,5 (m/s)1/2  
 \*\* detailed information on listed temperature ranges on request

## F3-F THERMO BULBS:

The super fast Thermo Bulb type F3-F is a high performance fast response Thermo Bulb featuring improved strength and sensitivity characteristics. The response time is 25% faster than the fast response bulbs type F3 and F3-SP.

## F3-SP THERMO BULBS:

The superior Thermo Bulb type F3-SP is a heavy duty fast response Thermo Bulb featuring an approximately 50% higher resistance against side impacts with the same Response Time Index of 32 ms (58 fts) as our well established Thermo Bulb type F3.

## XS THERMO BULBS:

XS stands for EXTRA STRENGTH. Due to special production methods these bulbs have an axial strength approximately 30% higher than standard bulbs ensuring high safety factors for special applications. These extra strong bulbs can be supplied as G5, F3 and F2.5 bulbs.



# SMART BULBS

The Smart Bulb is our latest invention. Other than the Thermo Bulbs listed before it can be triggered electrically and thermally. Three functions are combined in one smart glass bulb: Electrical activation, thermal activation and monitoring of each glass bulb. The biggest advantage is that the glass bulb can be activated electrically when the fire is still small and does always have the backup function of being thermally activated.

## 2 WAY ACTIVATION AND MONITORING

### THERMALLY ACTIVATED...

...like a traditional Thermo Bulb and/or

### ELECTRICALLY ACTIVATED...

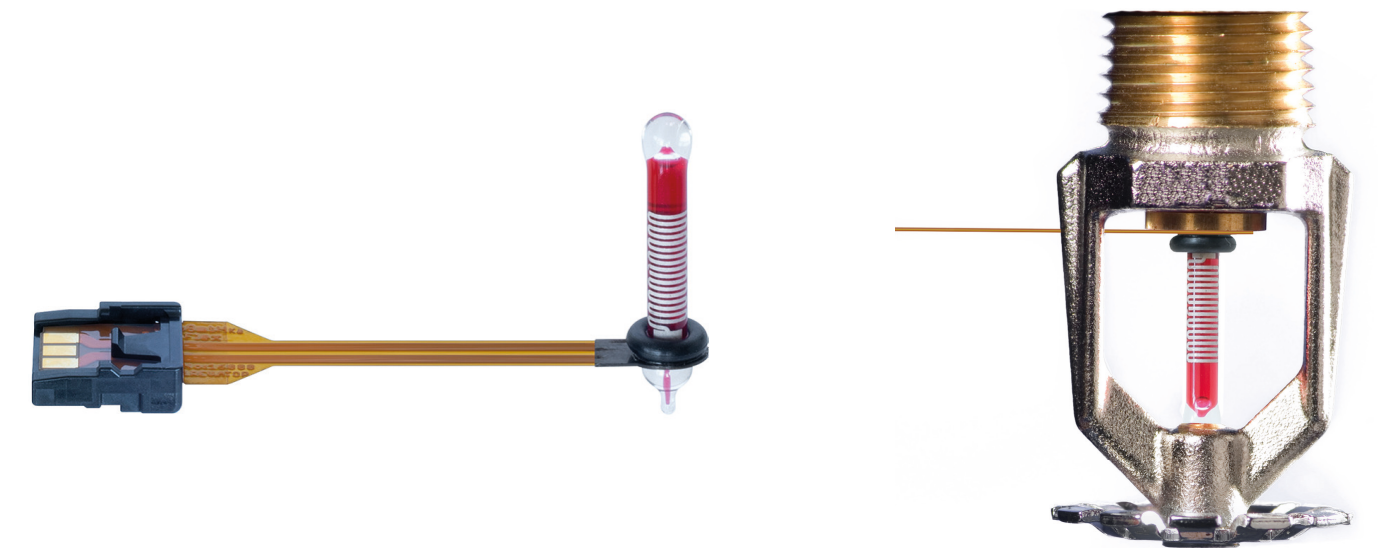
...by a current signal to the Thermo Bulb.

### MONITORING

...the status of the sprinkler is monitored.

Connected to a panel each sprinkler becomes addressable. Not only the location of the activated bulb/sprinkler is monitored, each glass bulb can also be triggered selectively.

The Smart Bulb is available as a 3mm and a 5mm size. It has a typical activation time of 2 - 5 seconds.



# CUSTOMER SUPPORT

Our qualified engineers assist customers utilizing JOB Thermo Bulbs to solve all kind of technical questions either from the head office in Germany or – if necessary – they also visit customer facilities.

JOB offers equipment to unpack the Thermo Bulbs out of the Bulb tape. Furthermore JOB provides equipment to carry out the final tests at the end user. The thermal bath test equipment is adapted to the ISO-standard and is used in the laboratories of UL, FM, VdS and TFRI. The final test of the assembled sprinkler at the BITE machine detects every possible damage of the glass bulb that could occur during the assembly procedure and is accepted by approval agencies to carry out the final integrity test required in approval standards.

JOB is a member of NPFA, IFSA, EFSN, NFSA and AFSE and participates in ISO, CEN, DIN and UL task groups.