

EC type-examination certificates of static flame arresters with crimped ribbon flame arrester elements

Impact on EC type-examination certificates issued by BAM and PTB due to the substitution of EN 12874 by EN ISO 16852 as a harmonized standard in the framework of Directive 94/9/EC

In the UAP-survey procedure the EN ISO 16852:2010 “Flame arresters – Performance requirements, test methods and limits for use” was adopted as an European standard and, therefore, will substitute the EN 12874:2001 using the same title. Since the vote of the CEN-Consultant regarding the EN ISO 16852 was also positive, it can be expected that this standard will be published in autumn in the Official Journal of the EU as a harmonized standard. Thus, the previous standard EN 12874 will no longer be a harmonized standard. The substitution of this standard does NOT result from safety-related reasons. Flame arresters corresponding to EN 12874 continue to comply with the essential safety and health requirements of Directive 94/9/EC.

The alterations compared to the previous standard EN 12874 are listed in the European foreword to EN ISO 16852. On the one hand, these alterations have resulted from compromises which were necessary in the course of the extension of the scope of the standard beyond Europe (e.g. new types of detonation flame arresters, explicit specification of the burning duration for short time burning resistant equipment) and on the other hand from the necessity of a clarification and improved description of test procedures.

Which consequences result from the substitution of EN 12874 by EN ISO 16852 for EC type-examination certificates issued by BAM and/or PTB?

1. Existing EC type-examination certificates

Basically, it can be asserted that the validity of existing EC-type examination certificates is not affected. As already described in the introduction, flame arresters duly placed on the market comply with the essential safety and health requirements of Directive 94/9/EC. Thus, there is NO necessity to replace the test specification given in clause 9 of the existing EC type-examination certificates by EN ISO 16852.

If the manufacturer wishes the alteration of the test specification given in clause 9 of the EC type-examination certificate with respect to the EN ISO 16852 it shall be verified that the tests carried out in line with the EC type-examination certificate at that time correspond **completely** to the test procedure described in EN ISO 16852. A comparison of the essential items of the tests required in EN 12874 and in EN ISO 16852 are given in table 1.

This results in the following method:

- Deflagration flame arresters (in-line flame arresters)

EC type-examination certificates for deflagration flame arresters can be changed to EN ISO 16852 without experimental re-examination on the basis of the existing test documents provided that the pressure of the deflagration test was ≥ 110 kPa. The technical documentation shall be checked for a possibly required update.

- Pre-volume flame arresters

The aforementioned statement relating to deflagration flame arresters applies here in the same way.

- Detonation flame arresters

EC type-examination certificates for detonation flame arresters can only be changed to EN ISO 16852 after experimental re-examination, as the scope of testing acc. to EN 12874 differs from that required according to EN ISO 16852.

The results of the burning tests (short-time burning or endurance burning) can be adopted, where the burning time for short-time burning flame arresters shall be specified to 1 minute on the type label and in the equipment documentation.

2. EC type-examination certificates for flame arresters which shall newly be placed on the market:

EC type-examination certificates for flame arresters which shall newly be placed on the market can still be issued on the basis of tests according to EN 12874 until the EN ISO 16852 has been published in the Official Journal of the EU, as the EN 12874 will keep its presumption of conformity until then. The EN 12874 will then be stated in clause 9 of the EC type-examination certificate as test specification.

AFTER the EN ISO 16852 has been published in the Official Journal of the EU as a harmonized standard new EC type-examination certificates can normally be issued only on the basis of tests according to EN ISO 16852, as - from this moment on - this standard features the presumption of conformity. The EN ISO 16852 will then be stated in clause 9 of the EC type-examination certificate as test specification.

Flame transmission tests	DIN EN 12874:2001	DIN EN ISO 16852:2010
Deflagration – end-of-line flame arresters	<ul style="list-style-type: none"> - 3 x 2 tests - largest and smallest NS 	<ul style="list-style-type: none"> - 3 x 2 tests - largest and smallest NS
Deflagration – in-line flame arresters	<ul style="list-style-type: none"> - 6 tests - largest and smallest NS - $10 \times D < L_u < 50 \times D$ (30 x D for hydrogen) - $L_p = 50 \times D$ (30 x D for hydrogen) - atmospherical test applicable up to 1.1 bar 	<ul style="list-style-type: none"> - 6 tests - largest and smallest NS - $10 \times D < L_u < 50 \times D$ (30 x D for hydrogen) - $L_p = 50 \times D$ (30 x D for hydrogen) - max. operating pressure = test pressure
Deflagration – pre-volume flame arresters	<ul style="list-style-type: none"> - 3 x 2 tests - all NS - atmospherical test applicable up to 1.1 bar 	<ul style="list-style-type: none"> - 3 x 2 tests - all NS - max. operating pressure = test pressure
Stable detonation – without restriction	<ul style="list-style-type: none"> - 3 tests - $L_p = 10 \times D$ (≥ 3 m) - 3 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - atmospherical test applicable up to 1.1 bar 	<ul style="list-style-type: none"> - 5 tests - $L_p = 10 \times D$ (≥ 3 m) - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 5 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - max. operating pressure = test pressure
Stable detonation – with restriction	not applicable	<ul style="list-style-type: none"> - 5 tests - $L_p = 54 \times D$ - restriction at $L_f = 4 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 5 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - max. operating pressure = test pressure
Unstable detonation – without restriction	<ul style="list-style-type: none"> - 5 tests - $L_p = 10 \times D$ (≥ 3 m) - 3 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - atmospherical test applicable up to 1.1 bar 	<ul style="list-style-type: none"> - 5 tests - $L_p = 10 \times D$ (≥ 3 m) - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 5 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - max. operating pressure = test pressure
Unstable detonation – with restriction	not applicable	<ul style="list-style-type: none"> - 5 tests - $L_p = 54 \times D$ - restriction at $L_f = 4 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 5 \times D$ - 5 deflagrations with $L_p = 50 \times D$ and $L_u = 50 \times D$ (30 x D for hydrogen) - max. operating pressure = test pressure

Tabelle 1: Comparison DIN EN 12874:2001 and DIN EN ISO 16852:2010 regarding tests for flame transmission safety

Burn test	DIN EN 12874:2001	DIN EN ISO 16852:2010
short-time burning	<ul style="list-style-type: none"> - $V = V_c$; $0.5 \times V_c$ and $1.5 \times V_c$ and contingently 50 % and 150 % of V with highest temperature (max. 5 tests) - $V = V_m$ (4. or 6. test) - 1 min - 60 K in 30 s 	<ul style="list-style-type: none"> - $V = V_c$; $0.5 \times V_c$ and $1.5 \times V_c$ and contingently 50 % and 150 % of V with highest temperature (max. 5 tests) - $V = V_m$ (4. or 6. test) - burning duration t_{BT} (max. 30 min) - signal in $t_{BT}/2$
endurance burning	<ul style="list-style-type: none"> - V_m as short-time burning test - T_{max}, if $\Delta T < 10$ K in 10 min - minimum burning duration 2 h 	<ul style="list-style-type: none"> - determination of V_m as for short-time burning test, time criterion is applied instead of temperature criterion - T_{max}, if $\Delta T < 10$ K in 10 min - minimum burning duration 2 h

Tabelle 2: Comparison DIN EN 12874:2001 and DIN EN ISO 16852:2010 regarding tests for burning duration