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Inland Transport Committee

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the

Working Party on the Transport of Dangerous Goods

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Reports of informal working groups

2 September 2014

Complementary information on BLEVE prevention work

Transmitted by the AEGPL, the European LPG Association

Summary

- Executive summary:** The European LPG Industry urges extreme caution when discussing the thermal coating mitigation measure. Any decision at this stage to make this measure mandatory in RID/ADR, would be at best premature and at worst, counterproductive to the stated aims of the BLEVE informal working group
- Key concerns:**
- Lack of risk analysis and impact studies at European Level
 - Lack of clarity on products concerned, transported by Road and/or Rail
 - Crucial issues still remaining unanswered (see page 5)
 - Lack of assessment of proportionality of this single measure and its effectiveness, against the assessment of the risk and level of acceptance (see also under Justification)
- Decision to be taken:**
- To not formally accept at this stage the thermal protection requirement in ADR/RID of rail/road transport tanks to resist in complete fire engulfment for at least 60 mins, as long as the issues unanswered are not clarified and satisfactorily resolved according to clear terms of reference.
 - Conduct a European Risk Analysis and impact study on possible options (as specifically done in the past for Netherlands and by DNV for-ERA & EU in the Rail sector), including cost benefits analysis of measures (as agreed at early stages in the WG). This to include also ranking of all potential measures (effectiveness and cost basis).
 - To continue developing the European Accidents Database for Transport of Dangerous Goods to serve the above
 - Continue the work to investigate: a) List of entries to which the requirement should apply, b) Certification of coating materials, c) Mechanical strength resistance to choc and accident, d) Ageing, e) Corrosion, f) Inspection (including possibility of removing thermal coating), g) Changes to the fire-fighting strategy (advice from fire brigade, as they are the first concerned)
- Related documents:** ECE/TRANS/WP.15/AC.1/2013/61 and ECE-TRANS-WP15-AC1-2013-GE-INF.7 (Netherlands)
 ECE-TRANS-WP15-AC1-2013-GE-INF.28 (AEGPL)
 ECE-TRANS-WP15-AC1-2013-GE-INF.31 (Italy)
 ECE/TRANS/WP.15/AC.1/2014/53 (Netherlands)
 ECE-TRANS-WP15-AC1-2014-GE-INF.8 and INF 9 (Netherlands)

Background

In March 2006, aiming to further increase safety in the Transport of Dangerous Goods, the ad hoc RID/ADR BLEVE prevention working group was created with mandate:

- (a) Prevention of a BLEVE
- (b) Reduction of the effect of a BLEVE
- (c) Hot BLEVE and cold BLEVE should be considered
- (d) Technical and other measures should be taken into account
- (e) Other matters of principle.

The scope of the work was defined to cover all dangerous goods / substances that could cause a BLEVE in Rail and Road transport.

Through the subsequent meetings that took place:

- Various possible measures were considered, but no conclusion was made on how to proceed on their ranking, due to lack of accidents statistical information. It had been agreed however that the ranking of measures should also integrate a cost-benefit analysis.
- The working group recommended to improve accidents statistical information by improving the reporting of accidents, develop an accident database and make this systematic (in progress under the leadership of France and with the encouragement/support of AEGPL)
- A research project financed by Germany and France was entrusted to BAM to produce a testing program to include the following:
 - (1) Definition of the conditions of a representative pool fire
 - (2) Description of the criteria for the selection of the coatings to be tested
 - (3) Description of the criteria for the selection of the safety valves to be selected, including evaluation of negative effects of safety valves (e.g. heat radiation)
 - (4) Evaluation of the tests already performed by BAM, TNO and of tests described in literature, which results in a list of questions not answered
 - (5) List of tests to be performed based on the not answered questions, including test priority.
- The results of the BAM tests were presented in the Sept. 2013 Joint Meeting by the Netherlands (ECE/TRANS/WP.15/AC.1/2013/61 and INF.7), commented by AEGPL (INF.28) and Italy (INF.31)
The AEGPL expressed clearly the position that the result of the BAM study/tests conducted did not contain sufficient justification to decide upon the application of a thermal coating to LPG road and rail tankers, raised additional concerns on the possible adverse effects of this yet unproven technology and its reliability and asked for further investigations and studies.
- In Dec. 2013, the TNO issued a further report aiming to clarify the issues and concerns and provide answers to the pending questions. This report was commented on, and discussed in the Bleve ad hoc WG meeting of April 2014, the report of which has been submitted for discussion in the present Joint Meeting (ECE/TRANS/WP.15/AC.1/2014/53, INF.8 and INF.9).

AEGPL is disappointed to note a selective reporting of what was expressed during this meeting and many of the comments it provided on the draft report not being taken into account in the final.

AEGPL regrets that the WP/53 from The Netherlands (dated 18/7/2014), was only posted on the UNECE 21/7/2014 (INF.2), which may result in insufficient preparation of the delegations.

The AEGPL position

Despite the progress and answers obtained since the last Joint Meeting, there still remain absolutely crucial questions unanswered, including issues and questions that have been surfaced new in the meantime. A decision at this stage on a mandatory requirement on this important issue would be at best premature, as it's first necessary to continue the work of research, with the aim to provide credible answers and solutions to these remaining important issues, and at worst, counterproductive to the stated aims of the BLEVE informal working group.

Key elements to this position:

- Level of risk.

Any safety measure mandated by authorised bodies within the developed world always considers proportionality of measure versus risk assessment. In Europe the Commission offers assurance to businesses that this is the approach they should expect through a rigorous impact assessment process. UNECE also declares a commitment to environmental impact assessments to accompany proposed measures. In this case neither of these processes have been undertaken. This was already underlined during the last WG Meeting of April. The LPG industry specifically, is in the middle of undertaking a project (using the figures available from France, as first example, before starting the same exercise at European Level) to attempt to quantify the level of risk and it believes that no proposal for action without this information can be credibly considered.

- Dangerous goods products and modes of transport concerned.

The mandated scope of work covers all dangerous goods/substances that can cause a BLEVE in Rail and Road transport. At this stage (due also to the lack of a European Risk assessment study), there is no list of the specific products and type of vehicles this requirement would cover.

- Thermal Coating.

In the submitted document by the Netherlands (ECE/TRANS/WP.15/AC.1/2014/53 dated 18 July 2014, report of the BLEVE working group), the Joint Meeting is asked to decide, in principle, on a requirement for thermal protection of Road/Rail transport tanks to resist complete fire engulfment for 60 mins. We believe that this request to the group is unreasonable before further investigations - as also identified by the group itself - are undertaken. No manufacturer of the suggested type of thermal protection coating is able to guarantee today its product for such use.

We believe that the option of some type of thermal protection and/or pressure relief valves for some types of vehicles may be a possibility and is worthy of further consideration. Any vote however now to require the industry to undertake thermal coating obligation (even if it's only in principle) with so many stated uncertainties (some absolutely crucial) and pending requirements for further investigation, risks the credibility of the proposal and even the process itself.

Justification

As known, there are 2 types of BLEVEs:

- ‘Cold’ BLEVE – Tank rupture due to collision impact, derailment, material defects or overfill
- ‘Hot’ BLEVE – Tank rupture from exposure to external fire (“thermally induced” BLEVE).

The Mandate of the Ad hoc RID-ADR Working Group covers both Hot and Cold BLEVEs.

The thermal coating measure addresses only 'Hot BLEVE'. The thermal coating measure would have had most probably no impact to about 94% of actual fatalities from LPG related Bleve accidents in Europe in the last 50 years.

The LPG industry in Europe utilises around 10000 tankers to deliver LPG to a diverse and widely distributed customer base, while an estimated further 5000 tankers deliver propylene (also classed as LPG in ADR) to a limited number of specialist commercial/industrial customers. Over the last 50 years these vehicles have covered billions of kilometres and have demonstrated a continually improving safety record. During this period 13 incidents of BLEVE have been recorded. Two of these incidents account for 90% of the fatalities associated with BLEVE the most serious one of which involved propylene and, in both cases, thermal coating would have had no impact on the effect of these incidents.

The level of risk from BLEVE in Europe

Within the developed world, an assessment of the risk, the impact of the proposed measures and a cost benefit analysis is a prerequisite before major decisions are taken. In the Netherlands, an extensive such study had indeed been prepared (KPMG, TNO, ECORYS, NEI) before the first related proposal to the RID/ADR was submitted (“Chain Studies Ammonia, Chlorine and LPG”), based however only on local conditions (population and traffic density, Autogas outlets network etc.), and considering the options related to the specific issues in the Netherlands (mainly Autogas outlets in relation to LPG) and not representative of other European countries. It includes societal risk, effect oriented issues, estimated likelihood, one-off investments, annual operating costs and net present value of the various proposals considered. To our knowledge, no similar study has been carried out in any other country to demonstrate any high level of risk from the various products and modes of transport that can produce a Bleve and call for additional measures to be taken.

The AEGPL has been consistently insisting on a similar risk based approach on this issue and had invited DNV in the last Bleve WG meeting to present the similar and related work carried for the European Commission and the Rail sector.

This above is directly related to our position on the proportionality of measures versus the risk assessment

Managing Potential BLEVE Events

In the report of the informal working group on BLEVE, it was reported that an unprotected liquefied gas tank in an engulfing fire is a risk that cannot be managed. This is simply not true. Many potential BLEVE events have been successfully managed over the years by the emergency services by operating a water cooling strategy to the tank which reduces the pressure to a manageable level far below that which could trigger a BLEVE.

To support this strategy infra-red cameras can also detect the temperature within the tank thereby giving a high level of predictability and early warning to a potential BLEVE.

Both of these tools currently available to the emergency services would have a far less of effect if tanks were thermally coated.

It can be argued that the loss of real time tank wall temperature determination caused by thermal coating, and the expected coexistence on the European roads for decades to come of: a) uncoated vehicles, b) intumescent coated vehicles and c) “blanket” type coated vehicles (as now used in the Netherlands), could

make the control of potential BLEVEs more uncertain and difficult than today (each type necessitating different handling) and put the safety of the emergency services at higher risk.

Thermal Coating

This measure is only relevant to the “Hot” BLEVEs. If it had been in place 50 years ago, it could have probably saved in Europe only about 6% of the LPG related fatalities.

The stated preferred type of thermal coating is intumescent epoxy (BAM/TNO report), while within the same report, 11 areas of further testing are listed as necessary before implementation. The actual list however of types and makes of the proposed products has never been revealed to allow detailed consideration, comments and further study on their chemical, toxicity, environmental and other characteristics. The fact that LPG trucks in the originating country of the proposal (Netherlands), have recently been protected (2009-2011), with a completely different type of thermal coating, considered only a few years later, as not the preferred and excluded from the BAM testing programme, calls once more for extra caution before unproven technologies and measures are adopted.

Still unclarified issues:

(a) Behaviour in accidents:

Unclear to what degree the coating resists a transport accident (collision, overturning etc.). Only intumescent epoxy coatings fulfil the requirements for heat resistant insulation in transport conditions (TNO), but the manufacturers do not provide data on their impact resistance

(b) Duration, ageing, life-time:

The manufacturers do not give duration and guarantees on life time of the coating under transport conditions (should last at min. until next requalification eg 6yrs, ideally for the life time of the tank, see also par.e on this section). Durability criteria (UV exposure, curing, elasticity, etc) still to be defined with “potential” manufacturers.

(c) Corrosion:

Corrosion may be possible between coating and metal, especially if the coating has cracked during transport. The manufacturers cannot guarantee on “something that moves and vibrates”.

(d) Inspection:

RID-ADR regulation prescribes that periodic inspection must be possible for tanks equipped with thermal coating. The diameter of the tank increases slightly during hydraulic testing; the coating must have the elasticity to adapt without cracking or losing adhesion. This must be proven by the manufacturer with an elasticity test. Ultrasound testing widely used in inspections, is not possible above a certain coat thickness. This thickness and other restrictions need to be defined and confirmed that are compatible with the inspection schemes.

(e) Fitting, retrofitting or replacing thermal coating on Road / Rail tankers

Application of thermal coating needs very specific conditions (temperature, air humidity etc.). This measure cannot be recommended for fitting tank cars/vehicles which have been in service already, because the necessary high quality standards could not be reached, even though the manufacturer of the tank car/vehicle would have to carry out the procedure (TNO report, BAM comments, 2008).

Currently, the manufacturers of thermal coating are not able to guarantee the life duration of the coating.

The intumescent coating cannot be removed by shot/grit blasting (TNO, last WG meeting), unknown if it is possible with other methods. A damaged coating or a coating that has reached its

life (life duration unknown at the moment) may not be able to be replaced due to the very specific conditions needed for its application (as stated above)

Currently it is unknown if the thermal coating will have a life to be able to accompany the vehicle for its entire life duration and it is also unknown if it will be able to be replaced on the same vehicle if its life is significantly shorter (and how often this might need to be)

Impact of additional weight

The additional weight on the tankers due to the thermal protection (which the industry has calculated as significantly higher than the 3% stated in the report (*)) will reduce their carrying capacity and lead to more vehicles and kms on the road. This goes against the continuous efforts and investments of the concerned industries to reduce road traffic and congestion and minimize environmental pollution.

The effect of any imposition of this unproven technology to road tankers and the subsequent increase in road journeys will undoubtedly create additional risks within the European road network.

(*) In the calculation from TNO it was assumed that all trucks were equipped with sunshield (which is not the case for all Europe)

Transition period

Since it is expected that a thermal coating protection measure would apply to new road and rail tankers only, the transition period and coexistence period amongst the various types of tankers available in Europe (uncoated tankers, coated tankers with intumescent coating and coated tankers with “blanket” type protection as in Netherlands), could be for decades to come. Similar issue would be present in the rail sector with coated and non-coated tankers. During this period, the control of potential BLEVEs will be even more uncertain and difficult than today for the emergency services, each type necessitating different handling. This would put the safety of the emergency services at higher risk.

PRV's:

There is a real deep knowledge in both industry and public laboratories on PRV's strength or weaknesses fitted on pressure equipments. This not yet the case on thermal coating.

Amongst facts that we all agree, even if PRV's cannot guarantee prevention of a Bleve (which is also the case for thermal coating), it has been proven in real accidents that PRVs have worked effectively to avoid a Bleve. In addition, it has been stated that PRV's, combined with thermal coating, could further delay a Bleve by ½ hour. This (despite the related AEGPL comment on the draft report) is still missing from the final report (ECE/TRANS/WP.15/AC.1/2014/53). As known, in many countries, road tankers are already equipped with PRVs. Due to the large experience already gathered with the use of PRVs across Europe, introduction of this technology in countries where road tankers are not yet equipped could be implemented relatively quickly.

Conclusion

The European LPG Industry urges extreme caution by the RID/ADR and associated groups when discussing the thermal coating mitigation measure.

At this stage, the proposal to require the option of thermal coating to be made compulsory into the RID/ADR as the only solution, while crucial pending issues are not clearly scientifically answered, is not acceptable.

Any decision at this stage to make the thermal coating measure mandatory in RID/ADR, would be at best premature and at worst, counterproductive to the stated aims of the BLEVE informal working group.
