AON SPRINKLER CERTIFICATION

Aon NZ Limited
Aon Sprinkler Certification
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Aon Sprinkler Certification Technical Note		
Note Number: 09-01	**Issue: 3**	**Date: 25 September 2017**
Subject	**Flexible Dropper Assemblies**	
Notice: Aon Sprinkler Certification Technical Notes provide guidance notes which may be used in certification of sprinkler installations by Aon New Zealand Limited. This note has been reviewed and endorsed by Verifire for installations being certified by them.		

This third revision of this Technical Note replaces issue 2, which was issued in October 2009. This revision highlights that retrofitting even one flexible dropper can have a significant impact on the hydraulic demands for a system, which may be critical for a system with small margins between supply and demand. Refer to section 3 of this note.

In addition, this note has been updated to reflect the requirements of NZS4541:2013. The changes are clearly identified by striking through the original text, and/or by a bar in the margin for new text.

1. TN-08-01 Dated 23 June 2008

It has come to our attention that the use of braided flexible sprinkler droppers is becoming more prevalent in New Zealand, as they may provide cost savings in the installation and alteration of sprinkler systems.

~~NZS4541 does not specifically allow for these units, albeit, they can be used under the auspices of either NZS4541:2007 clause 401.1 or Table 4.3 "Any other pipe, investigated for suitability in Automatic Sprinkler Systems , and listed as such by an SSC."~~

NZS4541:2013 clause 402.9 outlines the requirements of using flexible droppers. These include:

- Flexible droppers with braided stainless steel outer sheaths only may be used.
- Hoses need to pass a fatigue test as part of their listing. This fatigue test is as specified by FM Approvals in their Approvals Standard. (This does not mean that the hoses need to be FM Approved.)
- Installation requirements *must* be shown on the drawings, so that installation crews are aware of limitations, such as minimum bend radii and maximum number of bends.

The use of new technologies which lower the cost of sprinkler systems while maintaining reliability must be encouraged.

With this in mind, it is imperative that the listing requirements for these units be followed. *In particular, it is imperative that the friction losses through these assemblies be accounted for in hydraulic calculations for the systems. These losses are relative to the number and angles of bends permitted in the listing and the radii of any bend being greater than the minimum specified in the listing.*

In carrying out calculations, Aon notes that UL and FM have differing criteria. Generally, UL will allow tighter bend radii, but have higher friction losses for the same hose carrying out FM Approvals. This needs to be accounted for when specifying the allowable bend radii and

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number of bends required to be shown on drawings. A conservative approach would be to use the most onerous hydraulic length in calculations.

It is not an acceptable practice to overcome excessive flexible drop length by snaking or wrapping with multiple bends, exceeding the manufacturer's listing limitations.

Flexible bends do move and exert forces when pressurised. Particular attention needs to be made to ensure that they are adequately fixed using the fittings supplied as part of the flexible hose assembly and when specified, intermediate supports are provided,

Contractors intending to use these assemblies in any systems certified by Aon, please note this in section 9 of Aon's "Form 1 Application for Approval of Basic Design Parameters for Automatic Sprinkler System Installations," (~~revision 9, October 2009~~.) Please enclose a copy of the latest manufacturer's datasheet for the type of flexible dropper assembly being used on the project.

AS2118.1-2006 clause 7.6 provides useful guidance in the design and selection of these assemblies.

2. Reports of Field Installation Problems

Aon has received reports of a number of problems that have been seen on site where Flexible Droppers have been used. Generally, these issues are caused by a combination of poor installation techniques and the use of droppers that are too long.

In many cases, it appears that the issues may have resulted due to a lack of training of installation staff.

Another contributing factor to reported issues with these assemblies is that after the fire trade has installed them, other trades, such as HVAC and electrical trades move the flexible drops to assist the installation of their own services. While this is out of the control of the fire trades, ultimately the responsibility for the correctness of the sprinkler system still rests with the fire trade.

Typical faults that have been reported include:

- Wrong fixing clips. This is especially prevalent where the clips used to fix the drops to the ceiling rails are too short when used with concealed type sprinkler heads. If using flexible droppers with concealed type heads, care is required to ensure that the correct, taller clips are used.

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Correct clip for concealed sprinkler

Incorrect clip for concealed sprinkler

- The clips are not properly fixed. Some patterns of clips use a set screw to clamp the bracket against a ceiling rail, while others use a screw to squeeze the clip onto the rail. Cases have been reported where the fixings on the squeeze type clip have been installed using a clamp type approach.

Squeeze type clip incorrectly installed in a clamp style

Same squeeze type clip correctly installed

- Too many outlets off a single dropper. We have had a report on one site where three flexible droppers were fitted to a single 25mm dropper from the ceiling. This may be acceptable if reflected in the hydraulic calculations for the building.

- Flexible droppers being used which are too long, resulting in multiple bends, often off too short a radius. The length of the drops needs to be selected to suit the depth of the ceiling space. The minimum bend radius and number of bends allowed in the droppers needs to reflect the limits stated in the manufacturer's data sheets.

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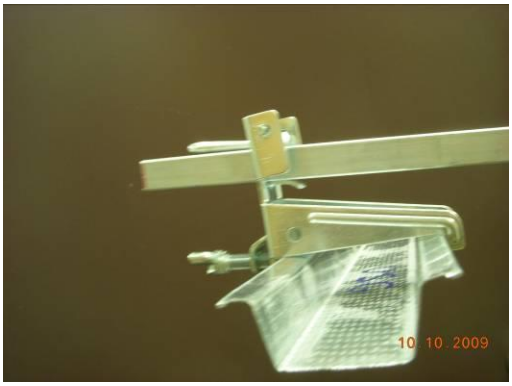
Two examples of over length flexible droppers, with excessive number of bends, or bends not meeting minimum bend radius requirements.

- Flexible droppers installed on the end of a long unrestrained steel dropper. In a seismic event, these are likely to whip around and fail.

- Wrong clips for ceiling assembly. This seems especially prevalent in fixed (gib type) ceilings



Special clip designed for trapezoid type fixed ceiling batten.

If these droppers are being used on a project, it is important that the Accredited Inspection Company be given the opportunity to inspect the installation during construction, to ensure that the flexible droppers are being installed in accordance with the manufacturer's instructions and that the installation reflects good trade practice.

As a result of the reported issues, contractors should be aware that the Accredited Inspection Companies will be placing a greater level of scrutiny in inspection installations with these units.

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It is recommended that when a contract commences, that the Accredited Inspection Company be invited onto site at an early stage, to review the installation practices for these devices, and then, carry out regular inspections during the course of construction.

3. Retrofit Situations

In carrying out service work, care must be taken in retrofitting flexible droppers, especially so, if the margin between supply and demand is low.

As an example, one of our clients recently was employed in an office fitout, where the existing ceiling was replaced, and the existing 10mm sprinklers were replaced with new 15mm sprinklers.

A small number of heads were relocated using flexible droppers. We asked the contractor to carry out a number of calculations to establish the possible design duty permutations:

Original Duty 6 K5.7 heads at 100kPa:	351kPa at 449kPa
Revised Calculation 6 K8 heads at 50kPa (No flexible droppers.)	353L/min at 400kPa.
Revised calculation 6 K8 heads at 50kPa, with 6 flexible droppers	359kPa @ 420kPa
Revised calculation – 5K8 heads, plus one with a flexible dropper	389l/min at 446kPa

In summary, with the specific pipe arrangement on this site, the installation of a single flexible dropper increased the design pressure by over 10%, from 400kPa to almost 450kPa.

Contractors using flexible droppers for service work should ensure that the hydraulic demands are accounted for in their design, and reflected on the system's files.

Chris Mak
Manager – Aon Fire Protection