

TECHNICAL BULLETIN



Subject:

SIGHT TUBE STATIC BUILDUP

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To ensure the safety of an operation using a pneumatic conveying system, especially in the presence of combustible dusts or flammable gases/vapours, precautions and design considerations must be made to minimise or eliminate the buildup of static electricity. In pneumatic conveying systems, one of the most common forms of static discharge is known as a propagating brush discharge. As detailed in the standards by the National Fire Protection Association, NFPA 652 9.4.7 and NFPA 654 9.4.3, "*propagating brush discharges occur when the rapid flow of particulate material generates a high surface charge on a thin non-conductive surface. The presence of this charge on one side of the material induces an opposite charge on the other side, essentially forming a capacitor. If the voltage difference across the material exceeds the material's breakdown voltage, then a pinhole is created at a weak spot in the material and the charges on the opposite surfaces are discharged through the channel.*" These discharges will not occur in materials that are sufficiently thick, defined as greater than 8 mm (0.315 in), or in materials which have a sufficiently low breakdown voltage, defined as less than 4 kV for films or sheets or 6 kV for woven materials. It is also noted in the NFPA standards that the presence of an external grounding wire on non-conductive objects will not prevent propagating brush discharge. The discharge energy produced can be on the order of 1000 mJ, which is sufficient to ignite flammable gases/vapours, hybrid mixtures, and dusts.

For operations conveying particulate material, products containing dust, or very light materials, such as hulls for example, extra caution should be taken in regards to static discharge. Due to the conductive nature of the standard Walinga conveying piping, the risk of static buildup and discharge is minimal. However, the use of clear plastic sight tubes, due to their insulative properties, presents the conditions necessary for static buildup and propagating brush discharge. There have been instances of static discharge in installations where plastic sight tubes are used to the point of observing arcing on the surface of the sight tubes.

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Head Office
5656 Highway 6N, Guelph
ON, Canada N1H 6J2
Tel (519) 824-8520
Fax (519) 824-5651

938 Glengarry Cr
Fergus, Ontario
Canada N1M 2W7
Tel (519) 787-8227
Fax (519) 787-8210

70 3rd Ave. N.E. Box 1790
Carman, Manitoba
Canada R0G 0J0
Tel (204) 745-2951
Fax (204) 745-6309

1190 Electric Ave.
Wayland, MI
U.S.A. 49348
Tel (800) 466-1197
Fax (616) 877-3474

PO Box 2426, 24 Molloy St
Toowoomba, QLD
Australia 4350
Tel (07) 4634 7344
Fax (07) 4634 7606

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Static buildup testing was conducted on an Ultra-Veyor system, specifically looking at the discontinued Walinga sight tube as well as the enhanced Walinga sight tube. The results of the testing can be seen in **Table 1**. Although no static discharge was observed during testing, high levels of static buildup were measured on the Walinga sight tube. The static buildup measured on the alternative sight tube was significantly lower.

Table 1: Static buildup testing results

	Grounded Aluminum Conveying Tube	Discontinued Walinga Sight Tube	Enhanced Walinga Sight Tube
Prior to Conveying	-0.02 kV	-0.04 kV	-0.02 kV
Low Capacity	0.00 kV	-4.7 kV	+0.45 kV
High Capacity	-0.02 kV	>20 kV (Over limit of meter)	Fluctuating from -4.5 kV to +5.1 kV

As demonstrated by the testing performed, the alternative sight tube is much less likely to result in propagating brush discharge compared to that of the standard Walinga sight tube. Therefore, moving forward, the standard Walinga sight tube will be discontinued and no longer produced or sold, in favour of the specialised sight tube. Please refer to **Table 2** for the new and discontinued sight tube part numbers.

Table 2: Sight tube part number reference

Discontinued Sight Tubes		New Sight Tubes		
Part Number	Description	Part Number	Qty	Description
11-113690-5	Piping Kit, UV, 3 x 24, Clear	51-80912-6	1	Sight Glass Tube, 3", 11Ga
		38-80279-6	2	Compression Coupling, 3"
11-113691-5	Piping Kit, UV, 4 x 24, Clear	51-144346-6	1	Sight Glass Tube, 4", 11Ga
		38-13084-6	2	Compression Coupling, 4"
11-113692-5	Piping Kit, UV, 5 x 24, Clear	51-80911-6	1	Sight Glass Tube, 5", 11Ga
		38-08787-6	2	Compression Coupling, 5"
11-113693-5	Piping Kit, UV, 6 x 24, Clear	51-144348-6	1	Sight Glass Tube, 6", 11Ga
		38-08785-6	2	Compression Coupling, 6"
11-113825-5	Piping Kit, UV, 7 x 24, Clear	7" Sight Glass Tube not currently available		
11-113827-5	Piping Kit, UV, 8 x 24, Clear	8" Sight Glass Tube not currently available		

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Please be aware that static discharge can be dangerous, causing both shock to personnel as well as ignition hazards for combustible dusts, flammable gases/vapours, and hybrid mixtures, resulting in possible fire or explosion. It is important to properly maintain a pneumatic conveying system to reduce the risk as much as possible. In addition to the replacement of the standard Walinga sight tube with the new specialised sight tube, please also consider the following to aid in reducing the risks associated with static buildup:

- Reduce the total number of sight tubes and use of flex hoses as much as possible. Use solid conductive conveying lines whenever and wherever possible.
- Keep sight glasses as short as possible. Minimising the length of the sight tube reduces the non-conductive surface area for particulate material to pass over to generate surface charges.
- In instances where a non-conductive material must be used, such as in sight tubes or flexible hoses, use materials with low breakdown voltages and thicker walls. Consider also using a material that is static dissipative.
- Minimise the applied loads to non-conductive materials. Increased loads can result in more material discontinuities, increasing the number of weak points in the material, thereby increasing the opportunity for pinholes to be created for static discharge.
- Properly bond and ground all sight tubes and non-conductive materials to prevent static buildup and discharge by methods other than propagating brush discharge.
- Ensure all conductive surfaces are also properly grounded, continuity is maintained over joints, and that any isolated conductive components are properly bonded to a grounded component or are independently grounded.
- Ensure any equipment connected to the conveying system is properly grounded to dissipate static charge.
- Ensure the facility is properly ventilated to prevent/minimise the accumulation of dust clouds, flammable gases/vapours, and hybrid mixtures.
- Consider reducing the conveying speed of the system to reduce static buildup.
- Take extra care and precautions during winter months when the humidity is low. Lower humidity levels can increase the static buildup on surfaces due to decreased surface conductivity.