

# SAFETY CRITICAL PLASTIC DUCTWORK SYSTEMS

Quoting a standard may not result in a compliant plastic ductwork system, says **Martin Whiteley**, managing director of **Roperhurst**, as he explains why you should always specify a BESA specialist member for this work.



Whenever specifications are issued for projects which contain industrial plastic ductwork (and by this we mean fume extract ductwork, rather than domestic toilet extract, etc.), we often see phrases like: "The plastic ductwork must comply with BESA's DW154."

In practice, what does this mean? The standard sets out rules and methodology for both fabrication and installation of plastic ductwork, but a phrase like this doesn't guarantee that it will be carried out by a BESA member competent in fabrication and/or installation.

Since only BESA members get audited to their specialisms, what comfort does the specifier, builder or end user get simply by quoting the standard and then getting a non-specialist to install it?

Indeed, would the specifier, builder or end user even know whether they were getting a compliant plastic duct system, properly fabricated or properly installed, once it's up in the air, perhaps hidden away behind ceiling tiles. After all, it's only plastic. Isn't it?

The Grenfell tragedy has focussed the minds of specialists within the sector on the importance of using specialist contractors to carry out specialist tasks. Not surprisingly, the focus has been on fire safety, but in reality every system going into a building that has a risk mitigation function will be subject to the same level of critical assessment.

Essentially, is it safe?

## Why is plastic ductwork safety-critical?

Industrial plastic ductwork is used for the conveyance of hazardous fumes and vapours from point of creation to a point of safe discharge, sometimes through a scrubbing system, often direct to air at high level.

Plastic is used because it has high chemical resistance. The most frequently used materials are PVC and polypropylene (usually in a flame retardant form known as PPs). Often these can be reinforced with GRP/fibreglass for additional strength, UV stability or aesthetic reasons. >>



This last point is critical, as too often defects are not easily spotted unless you have specific knowledge and experience, and only become apparent when it's too late. The legacy of Grenfell is that responsibility cannot be abdicated down the supply chain.

### Material selection

PVC is typically the material of choice for school and college fume cupboard extract systems. It generally has very good chemical resistance. Is readily available in extruded tube up to 600mm diameter and is (relatively) straightforward to install. Ductwork is jointed using either mechanical flanges, solvent welding or hot air welding.

University, research and industrial facilities would normally favour polypropylene (PPs) over PVC. It has a superior chemical resistance, especially to solvents, and broader chemical resistance is very important where the focus of activity or research (and therefore also chemicals in use) is likely to change over the working life of the system.

This begs the question: we have a process that creates hazardous fumes or vapour, transported through a system made from a material which has high chemical resistance – so wouldn't you want to be certain that it has (a) been fabricated correctly and (b) installed correctly?

For this reason, BESA has been working with partners on three key areas:

1. To educate designers, consultants and specifiers that simply quoting the standard is not sufficient - quality assurance can only be delivered by specifying use of a BESA specialist plastic member for both fabrication and installation;
2. To update the "Find a Member" section of the BESA website so that DW154 specialists can be easily identified and contacted; and
3. To educate and upskill industry generally as to what the DW154 standard requires, and what this means in practice.

### Issues with fabrication

Not every general plastics fabricator has the full range of equipment, and compliance with DW154 makes fabrication more complex and therefore more expensive. Shortcuts include:

- Using thinner sheet material than specified in DW154: Impossible to identify once installed;
- Not minimising risks of future leaks by appropriate positioning of welded joints, as specified in DW154;
- Applying fewer welds than required (a factor of the thickness of material): Insufficient internal welds are impossible to identify once installed;
- Failure to etch PVC before applying GRP: will only become apparent over time when the GRP on the duct begins to delaminate. >>



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**Issues with installation**

On PVC systems, solvent welding is generally the method of choice for the uninitiated, and if the joints aren't prepared/cleaned properly, or insufficient solvent is applied, this won't be obvious on inspection. It will however present a future risk should condensate leak.

Hot air welding requires skill and experience. The weld should create a continuous, homogenous piece of material, but done badly all you get is one piece of plastic lightly stuck to another – close to useless, but not immediately apparent.

PVC and polypropylene are incompatible thermoplastics. That means that no matter how hard you try, they cannot be hot air or solvent welded to each other. Systems which have both materials (a lower-risk PVC leg attached to a polypropylene header, for example) must be jointed using mechanical flanges.

Use of silicone and other sealants, tech screws, rivets, etc to join socket and spigot joints has never been acceptable, but unfortunately all too common in far too many buildings across the UK. These joints will leak, the fixings will corrode, and hazards will be released.

**Next steps**

When specifying and contracting safety-critical industrial plastic ductwork to DW154 you must ensure that the sub-contractor is a BESA member specialising in in-house industrial plastic ductwork fabrication and installation. Use the “Find a member” function on the BESA website to assist you.

Educational resources on the BESA website provide background on the kinds of shortcuts to look out for, and how to identify compliance with DW154. And remember the old adage that you have to pick two from three – price, quality, delivery. Cheapest is rarely best value, especially now that the personal and corporate consequences of failure even several years down the road can be so high. ■



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safety-critical plastic engineering

**THE PLASTIC DUCTWORK SPECIALISTS**

**PLASTIC DUCTWORK IS A SAFETY-CRITICAL COMPONENT, USED FOR HAZARDOUS FUMES & VAPOURS CREATED BY CHEMICAL, BIOLOGICAL OR RADIOACTIVE PROCESSES.**

**IF IT'S SAFETY-CRITICAL, YOU NEED A SPECIALIST**

**WHO WE ARE?**

Established for over 45 years, Roperhurst is a market leader in fabrication and installation of safety-critical plastic ductwork systems to DW154.

Our experience provides reassurance when you need it the most.



**WHAT WE DO?**

We fabricate and install all types of industrial plastic ductwork, including PVC, polypropylene, PPs, PPs-EL, PVC/GRP and FBPP/GRP.

All ductwork is to DW154 standard by our highly experienced and qualified professional team.



**MANUFACTURE**  
Circular and rectangular ductwork up to 4000mm. All quality assured to ISO9001:2015.

**INSPECTION**  
Ductwork/pipework, leakage testing & LEV testing under COSHH Regulations.

**INSTALLATION**  
In-house teams working throughout the UK & overseas to DW154 & DW144 standards.

**MAINTENANCE**  
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