

# Pipeline construction & the risks of manual handling.

*Safe manual handling is considered to be one of the most essential Health & Safety aspects at a construction site. The Health and Safety Executive (HSE) reported in 2004 that more than a third of all over-three-day injuries reported each year are caused by manual handling. With some pipeline product manufacturers ( $\geq$  DN225) promoting their pipes as light or “suitable for manual handling” it is important to understand the risks associated with the handling and lifting of pipeline products and explore the facts behind different “manual handling” marketing themes. This information sheet looks at manual handling and the risk posed by a perception that a pipe is ‘light’ and can be safely handled and lifted manually.*

## Understanding Manual Handling

Injuries caused by manual handling and lifting in the work place have always been a major concern. HSE reported that injury due to inappropriate handling of objects at work (including lifting of heavy objects) accounted for 38% of over-three-days injuries in 2001/02. This issue should form an integral part of any construction site risk assessment where there are typically many more instances of manual handling in the workplace.

The limitation for ‘*how heavy is an object*’ is subject to a number of considerations. The Manual Handling Operations Regulations 1992 (as amended) establish a clear hierarchy of measures for dealing with risks from manual handling. These are:

- Avoid hazardous manual handling operations so far as reasonably practicable;
- Assess any hazardous manual handling operations that cannot be avoided; and
- Reduce the risk of injury so far as reasonably practicable.

The Manual Handling Assessment Charts (MAC) is a new tool designed to help assess the most common risk factors in lifting (and lowering), carrying and team handling operations. MAC identifies load weight, loading frequency, hand distance from the lower back, trunk twisting and sideways bending, and vertical lift region, grip on the load and floor surface as factors that can help assess the level of risk within a manual handling operation: The HSE guide INDG143 “Getting to grips with manual handling” offers guidance on weight limitations for manual handling. Figure 1 shows maximum weight limitations for handling, lifting, and lowering for male/ female operatives. These limitations should be reduced by 30% if the pipes are to be lifted or lowered repetitively by a rate of one or two lifts per minutes and by 50% if lifts range between five to eight times per minute. The limitations should also be reduced if the handler twists to the side during the operation.

Most pipeline products  $\geq$  DN 225 do not come with handles, may enforce some postural constraints during lifts, will certainly require bending and twisting and may cause unstable footing at construction sites. This means that assessment of manual handling is not a straightforward load weight/frequency operation and more scrutiny may be needed at site.

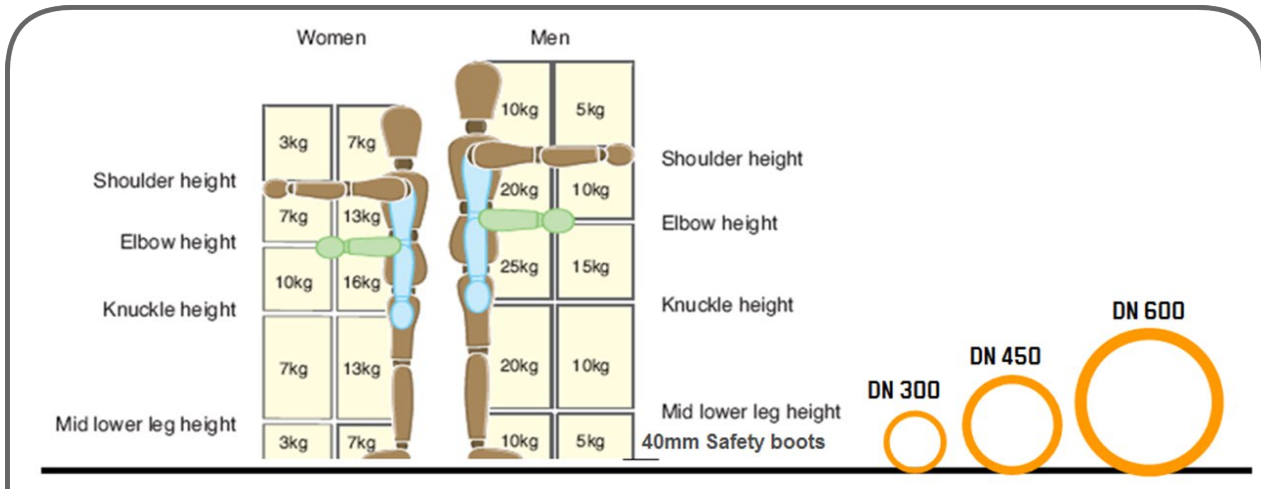


Figure 1. Lifting and Lowering weight limitations (HSE, 2004)

These limitations clearly show that **concrete pipeline systems should not be lifted or carried manually**. There are a number of established tools and methods that should be used to handle concrete pipeline systems. The use of proper lifting systems for concrete pipes should reduce levels of risk at site. A contractor will need to be aware of these lifting systems and should conduct a proper risk assessment to explore how concrete pipeline products can be safely handled on site.



Figure 2. Proper lifting systems for concrete pipes reduce levels of risk.

## Pipe lightness vs. Suitability for manual handling

It should be noted that not all pipeline products are promoted by their manufacturers as unsuitable for manual handling. A contractor must validate these messages which may fuel false perceptions. For example:

- A plastic pipe manufacturer’s brochure cites “*lightweights for reduced Health & Safety risks*”.
- A builders’ merchant brochure for two plastic pipe brands claimed “*Reduced health and safety risks in handling, storage and installation...*”

These claims echo a wide-spread perception that the relatively lighter weight of plastic pipes will always make them easier to handle and should pose lower levels of H&S risk than concrete pipes. The sources quoted above did not refer to any specific studies to confirm their claims. No specific reports on installation requirements or comparisons of accident rates were identified.

If a pipe is “lighter” in weight it doesn’t always mean that it can be manually lifted and handled safely. Table 1 provides weight information for some plastic pipe brands known to be promoting H&S advantages of their products due to their weight. It is evident that many pipe sizes should not be lifted manually off the ground from the crown of the pipe given the weight limitations of mid lower leg height lifting/lowering (between 5 and 10 kg for male/ 3 to 7 kg for female):

Plastic Pipe Type	Weight of a 3 metres long pipe (Kg)						
	DN 225	DN 300	DN 400	DN 450	DN 500	DN 600	DN 750
Brand 1	13.5	22.5	-	-	-	-	-
Brand 2	-	-	28.2*1	35.4*2	39.9*1	45.9	105
Brand 3	-	-	39	48	51	57-78	75-96
Weight of a 6 metres long pipe (Kg)							
Brand 2	-	-	56.4	70.8	79.8	91.8	-
Brand 3	-	-	78	96	102	114-156	150-192
Brand 4	22.5	36.6	-	58.2	76.8	106.8	-
Brand 5	18	30	49.2	61.2	70.8	93	-

1. Weight is too close to maximum and will not be sustainable for any length of time, long distances, repetitive lifts, or using a single hand. Weight also requires a close and vertical body condition.
  2. Weight is well over 30 kg, an average weight for loads lifted below knee level and between the 10 and 20 kg boxes at Figure 2 for Male, and is therefore heavy.
- Loads are within HSE manual lifting guidelines for two operatives.
  - Load may only be suitable for two male operatives.
  - Load above recommended maximum for two male/female operatives.

**Table 1. Weights of different plastic pipeline brands classified in accordance with lifting limitations as described at by HSE (see Figure 1).**

The table clearly shows that manual lifting is not advisable for many plastic pipes. Manual lifting outside the HSE guideline limitations can increase the risk of injury to operatives. Mechanical lifting is recommended for most plastic pipes over DN300 in size and the “*ease of handling/installation*” advantages claimed in suppliers’ materials are not valid for the vast majority of cases if safety best practice is to be followed.

There is a need to understand the risks of manually handling excessive loads. Unfortunately, there are indications that HSE Guidelines are being ignored. In Figure 3, the image of a man lifting a 3 metre long DN300 Brand 1 pipe up to shoulder level was reconstructed by BPDA exactly as shown in a similar image

published by the manufacturer. This is clearly outside the HSE lifting and lowering limit of 10 kg at shoulder level. The load is actually more than double the recommended level.

Figure 4 shows two male operatives carrying a 6 metre DN 600 *polyethylene steel reinforced pipe*. The pipe weighs 93 kg and should never be handled by two (or even three) operatives.



Figure 3. DN300 Brand 1 pipe lifted by one man at shoulder level.



Figure 4. DN600 polyethylene steel reinforced pipe lifted by two operatives.

False perceptions associated with lightness can pose a threat to a workforce. It is wrong to assume that *lighter* weight is the same as light. It is also dangerous and may play a part in increasing the risk of injuries.

In contrast, knowing that a specific product is 'heavy' means that it is handled with respect and it is less likely that short cuts will be taken that place operatives at risk. When handling a concrete pipe or manhole, proper procedures exist to deal with the loads. BPDA produces an **Offloading Guide** which explains the procedures and tools to ensure that these products are handled safely.

## REFERENCES

HSE (2004) Getting to Grips with Manual Handling. *Health and Safety Executive (HSE) Leaflet INDG143 (rev2)*: <http://www.hse.gov.uk/pubns/indg143.pdf>

HSE (2003) Manual Handling Assessment Charts. *Health and Safety Executive (HSE) Leaflet INDG383*: <http://www.hse.gov.uk/pubns/indg383.pdf>

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