



29. JAHRESTAGUNG 29TH ANNUAL CONGRESS



Topic Pulling Forces

Disclaimer

This is a summary of the of the comments are made by the DCA-Members to this item in the workshop. Some of the comments are contradicting each other. These do not necessarily represent the opinion or standpoint of the DCA as an organisation.

The DCA will use this information in the next revision of the technical guidelines as the association feel appropriate.

Topic

All comments

Who has read the guidelines, and who uses the below formulas in day to day business?

- Most people use Pipe Stress calculations, e.g. ASTM F1960 or NEN3650, rather than Formula 10 and Formula 11 from the Guidelines. A lot of companies have developed their own spreadsheets to calculate pipe pull forces.
- Most have read parts only; depending on the topic,
- Some have not read it at all, some very thoroughly
- Some did not know that these formulae were in the guideline, but use it to get a rough idea of the result

Does any of this need further explication?

- Why do we have two formula for the same pull force?
- Having two formulae is an opening for discussion; At least a remark that further considerations should be based on the highest outcome
- Formula 10 was considered to be more relative to Downhole Weight, with Formula 11 more relative to the Friction between the pipe and the bore. The two calculations should be combined.

Formula 10 of guidelines

Formel 10

$$F [kN] = L \cdot G \cdot f$$

F	= Zugkraft	[kN]
L	= Bohrlänge	[m]
G	= Effektives Gewicht der Leitung (Auf- oder Abtrieb)	[kN/m]
f	= Faktor f	[-]

- Formula 10 was considered to produce 'high' pipe pull calculations.
- Is used for first estimate
- One company made an excel tool, based on this formula
- Other, more reliable and accurate, methods are used
- Known by HDD contractors
- Be careful of this formula when difference in elevation between entry and exit (separate empty hole section to fluid hole section)
=> not the same weight
- Sticking of the pipe to the borehole wall may occur, especially when pulling is interrupted; Tis should somehow be referred to
- Formula not known/used, prefers ASTM

Formula 11 of guidelines

- Formula 11 was considered to produce 'low' pipe pull calculations.
- Friction factor relies a lot on fluid characteristics
- A good mud may reduce the friction
- When large reaming operation, the mud is not really behaving as a fluid but more pudding getting out of the hole (increased pulling force)

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29. JAHRESTAGUNG 29TH ANNUAL CONGRESS



<p>Formel 11</p> $F [kN] = L \cdot D \cdot f \cdot \pi$ <p><i>F</i> = Zugkraft [kN] <i>L</i> = Bohrlänge [m] <i>D</i> = Rohrdurchmesser [m] <i>f</i> = Faktor f [-] <i>π</i> = Kreiszahl = 3,14</p>	
(missing) Factors for pulling force/which values do you use?	<ul style="list-style-type: none">• Pipe material not considered• Wall thickness not considered• Depending on personnel• Location and profile
Average, gutt feeling, add relevant ones	
Other standards/websites/apps used	<ul style="list-style-type: none">• Phrikolat app• Tracto app• AMC app• CEBO app• Gutt feeling• Deltares
Experience of outcome of calculation in relation to actual experience	<ul style="list-style-type: none">• Ballasting the Pipe/Mud Weight should be given more weighting in the calculation.• Calibration of the Rig?• In general calculation are more conservative than actual pull force 9/10)... but be prepared in case it exceeds• Most of the time actual pull force being below the calculation
What to do if the outcome of the calculation exceeds allowable?	<ul style="list-style-type: none">• Only considered relevant for PE pipe. If the calculations are wrong it is because the assumptions made are wrong, and they will only be out by ~20% to ~30% which is accounted for by the Safety Factor. If the problem is with the hole, the calculations are out by 2x or more and a serious problem has developed.• Some stop the pullback before being stuck
What to do if c the outcome of the calculation exceeds capacity of the planned rig?	Who sets the Pull Force limit? The Rig Operator, the Client who specified the pipeline or the clients Insurance Company?
Buoyancy Formula	Is there a Formula in the DCA Guidelines for calculating pipe Bouyancy - 'G' in Formula 10
Pull forces recording	Pull forces are often recorded at the rig, but how often is this calibrated?

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29. JAHRESTAGUNG 29TH ANNUAL CONGRESS



	According to standards and on request of some customers, pulling forces must be recorded at the pull head; Difficult to find proper device and it increases distance from swivel to pulling head
Pipe Pushing Calculations	With Pipe Pushing becoming more popular the DCA Guidelines should include Pipe Pushing calculations. There is no “Standard” calculation for Pipe Pushing stress calculations.
f Factor	The ‘f’ Factor is not a Friction Factor but a Pull Force Coefficient’.
Rig Anchorage	<ul style="list-style-type: none">• Do you design the anchorage to the maximum pulling force of the Rig / Maximum Pull force allowed by the pipe / Maximum calculated pull force x SF?• Depends on the project.

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