Topic RADII

	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	**Remarks**

General	• The chapter Radii is not known to most members
	• The chapter is not well understood by those who did read it (both the current and the previous version)
	• Table 3 and figure 2 (page 39 and 40 English version) should include a value for C in boulder clay and marl
	• More emphasis on the requirement for larger radius should be put in case of:
	  ○ Use of mud motors
	  ○ Unfavourable soil conditions
	  ○ Large diameters pipe
	  ○ Longer HDD ´s (> 800 m) in the eye of the beholder
	• A flow chart how and what is calculated and compared would be desirable
	• A simplified basis for the calculations is desirable, e.g.
	• There is a contradiction between the concept of having a changeable subsoil surcharge for calculating a design radius (from 1.2 to 1.8) but allowing for an overall drilling tolerance of 10% of the design radius. If the subsoil surcharge is to account for a formation causing unexpected drilling conditions, then there should be an increase in the accepted drilling tolerance.
	• There was a recommendation that more investigation / calculation over how the size of the reaming overcut can affect the final radius of an installed steel pipe. There are apparently oil and gas calculations that apply this concept to casing, even horizontally
	• Basis: R min = 1000 x OD
	  ○ jettable soils safety factor 1.5 x Rmin
	  ○ rock/use of mud motors: safety factor 2 x Rmin

R_min	• For HV Cable, the radius is not relevant, since both cable and duct have low allowable radii. Correct position (left/right and level) are more important. • Steering tool and other radius increasing parts such as mud motor should be mentioned. Provide examples and minimal values • S safety factor could be used here as well and replace the 10%, e.g. Rmin should not be underrun by 20% • For certain coatings on product pipe, it may be advisable to use a larger radius. • The 10% smaller radius from page 44 seems in contradiction with the other. • It might be advisable to attach an appendix with drill pipe diameters with minimum radii. Many don't understand the minimum bending radius for drill pipes. • In the section 4.1.3.3 regarding the bending radii of different pipe materials, generally the figure of 50D is used so the effect of temperature could be disregarded.
R_Design	• Engineering companies do not always use large enough radii • The influence of the BHA (Steering tool, non mags etc) and the factor C (table 3) are often not considered • There was a comment about the consideration of the minimum radius for reamers, especially on larger diameter projects even though minimum radii are normally not included on specifications for reaming tools
R_Constr	• It should be emphasised that this radius is the decisive radius • Must be larger than Rmin, theoretically only 10% deviation from Rdesign (unrealistic, should be 30%) • What about deviations due to obstacles? • Maybe the annular space should be included somewhere. • A 20 or 30% larger hole diameter will reduce the risk, and partly reduce the radius (over a part) • A clean hole is also an influence factor for the radius.
R_min Steel	• Is conclusive
R_min PE	• Hardly relevant, since Drill pipe and BHA are dictating radius in this case. • Is conclusive • The table 4 seems more for laying pipes and not relevant for HDD • HDPE could be better explained while everybody knows we still have minimum 1 flat HDPE pipe per day in our industry. • The opinions about the reasons vary.

Overbend	• Calculation is clear and correct • Is conclusive
Combined Radius	• Combined radius often not considered in design, resulting in a too small radius • Minimum Curvature and actual radius in as built • Should be emphasised more, the effects of it should be better explained • Is the decisive radius for the (steel) pipe • Especially for overbends the coating can be an issue because many companies use small radii, and little nr of lifting points.
Neues Thema	On page 99 (German version) the various pipe materials fit for HDD are described. In section 7.3.1.4.1 (PE pipes) more detail should be given, e.g. RT, RC etc
20 “ Steel - What Radii is basis for the Drill-Line? Why?	Depending on many factors such as steel quality, wall thickness etc
How can you fulfil the Accuracy of 10%?	Much more difficult with a large radii. Staggering may be advisable. (e.g. upto 300 m -> 10 %). As a recommendation it is fine, Emphasis should be put on the fact this is to be looked at per crossing 10% can only be achieved under good (drilling) conditions, otherwise not possible 10% is too strict, is causing forma, administrative problems, despite there is no actual technical problem Not realistic, recommendation to use 30%
General remarks in relation to radii	Remark that there should be a straight section at both entry and exit sides In general, the chapter is considered to be well described, in sufficient detail.
General remarks to the new revision	Page numbering on the inside of the printed version not practical Proposal: Use more examples of actual jobsites; on the other hand, this was rejected.