

UNLOCKING NEW APPLICATIONS:
PP-RCT FOR DEMANDING SKYRISE BUILDINGS

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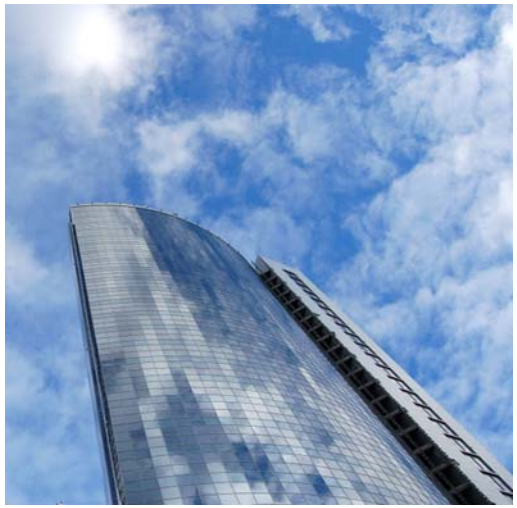
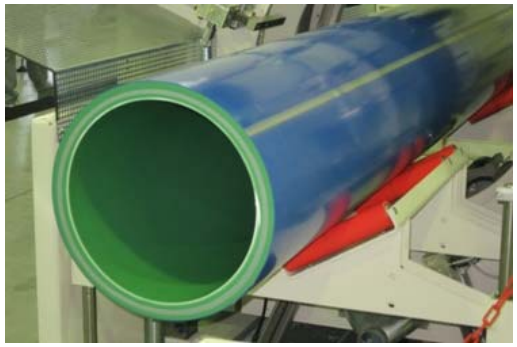
Table of contents

- The role of PP-R in hot & cold water applications
- Introducing PP-RCT, the 2nd generation PP-R material
- Mechanical properties and capabilities of PP-RCT
- PP-RCT in Standardisation
- Disinfectants and PP-RCT
- Case story: King Abdullah Financial District
- Outlook and concluding remarks





The role of PP-R in hot & cold water applications

- PP-R was introduced to the market some 30 years ago
- The material significantly contributed to the acceptance of plastic pipes for plumbing and heating
- Light weight, ease of handling and multifaceted properties contributed to the success
- While pipe systems have been developed over time, PP-R has largely stayed the same
- Raw material producers were therefore focusing on bringing the next generation PP-R to the market





Courtesy of Bänninger

Introducing PP-RCT, the 2nd generation PP-R material now with 10 years track record

- The first PP-RCT material was launched back in 2004
- PP-RCT set a milestone in the advancement of hot water PP pressure piping systems
- PP-RCT (Polypropylene-Random Crystalline Temperature) is a hot & cold water material class designation
- The designation PP-RCT was adopted following the guidelines given in ISO 1043-1
- It refers to Polypropylene pipes that enable an improved resistance to pressure, especially at elevated temperatures





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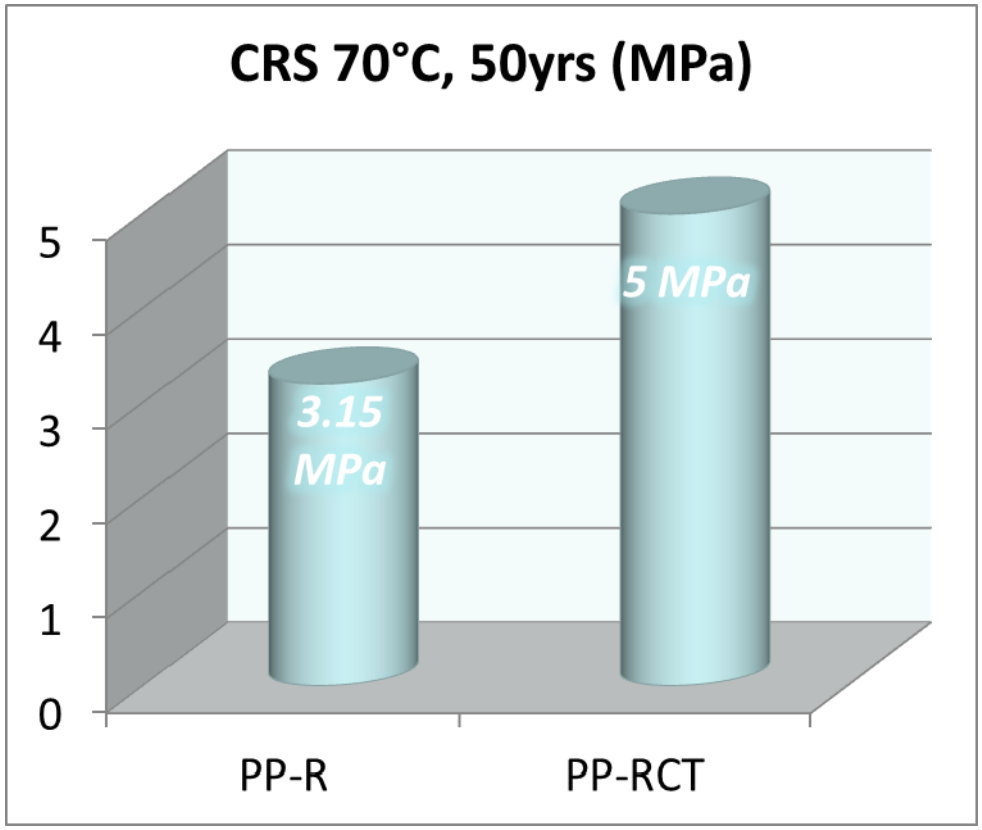
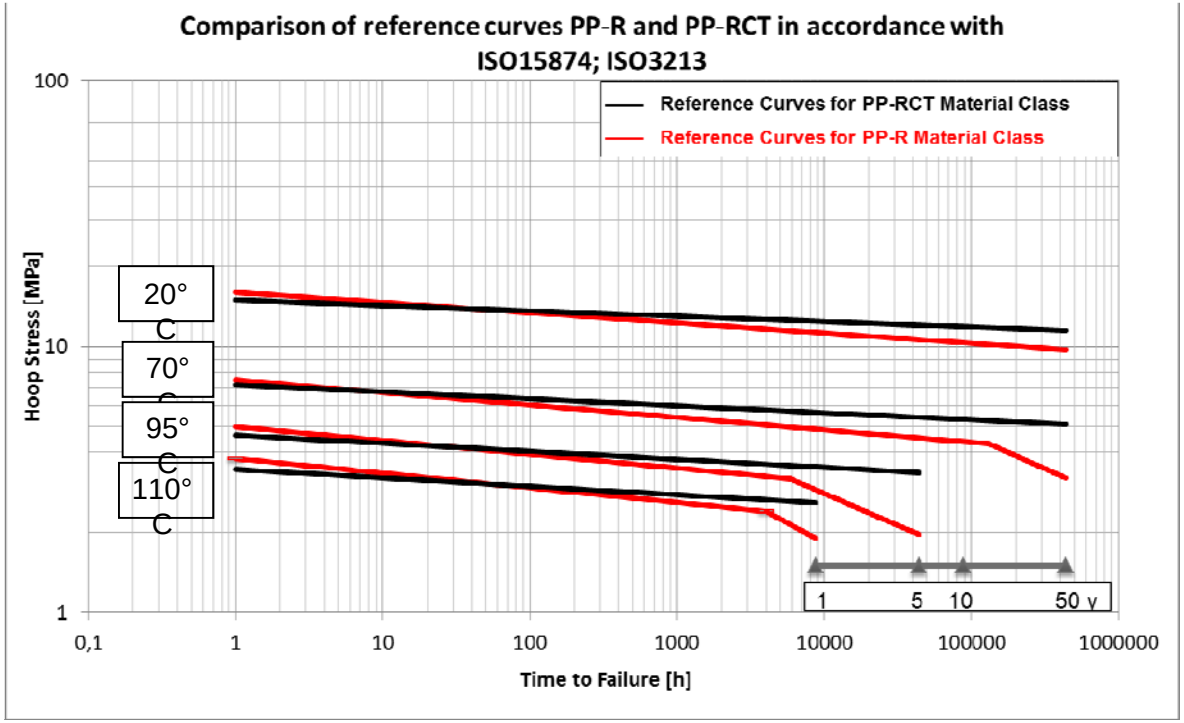
PP-RCT delivers more than 50% improvement in pressure resistance



- CRS $_{(70^{o}C\ 50\ y)}$ is the most suitable reference for hot & cold water applications
- MRS $_{(20^{o}C\ 50\ y)}$ values are used for cold water piping only
- Not only pressure resistance but also impact performance needs to be considered
- Impact resistance at room and cold temperature has to be kept identical or higher

PP-RCT reference curves show higher pressure resistance and no knee as with standard PP-R



- PP-RCT materials are required to fulfill the reference lines of PP-RCT as specified in ISO 15874 and ISO 3213
- Reference curves of PP-RCT do not exhibit a knee, which is indicative of a sustained performance over time (no brittle failures)

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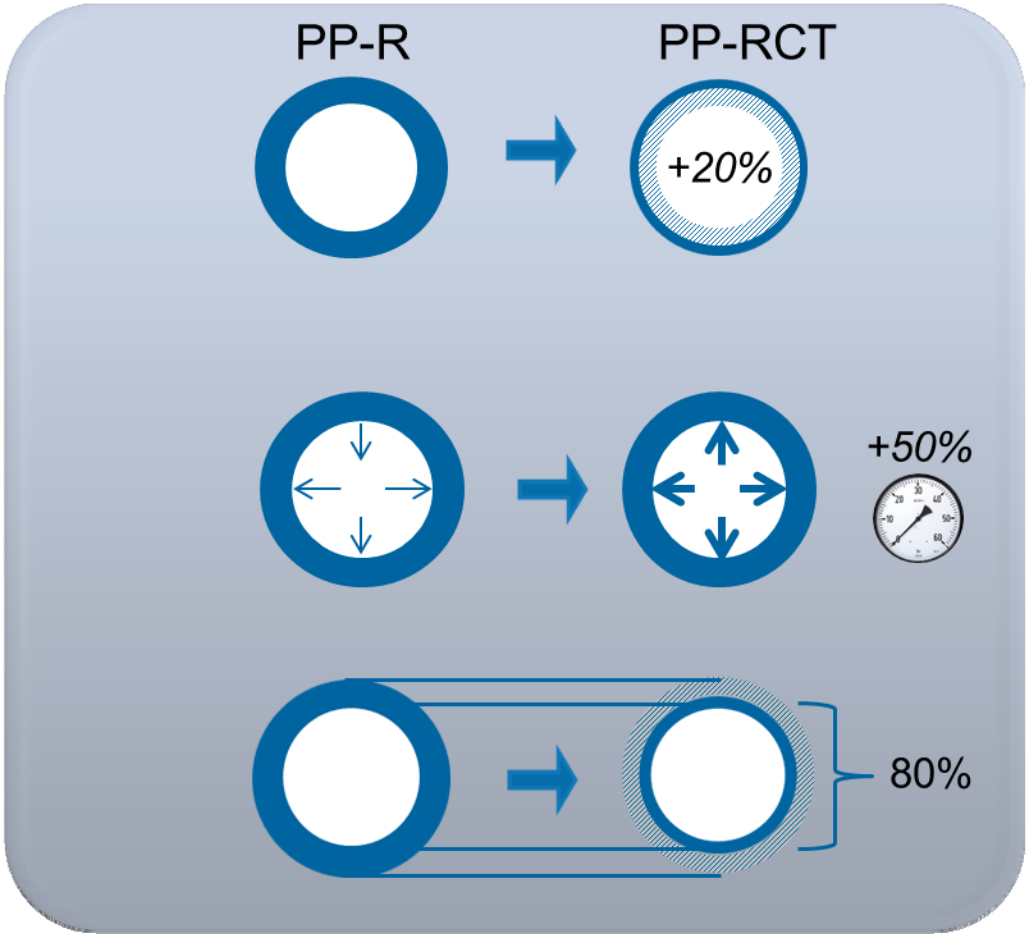
The enhanced performance of PP-RCT can be utilised in multiple ways

- Higher hydraulic capacity
- Pipes with higher pressure resistance (hot water)
- Pipe outer diameter reduction



Graphics are for illustration purpose only, not in scale

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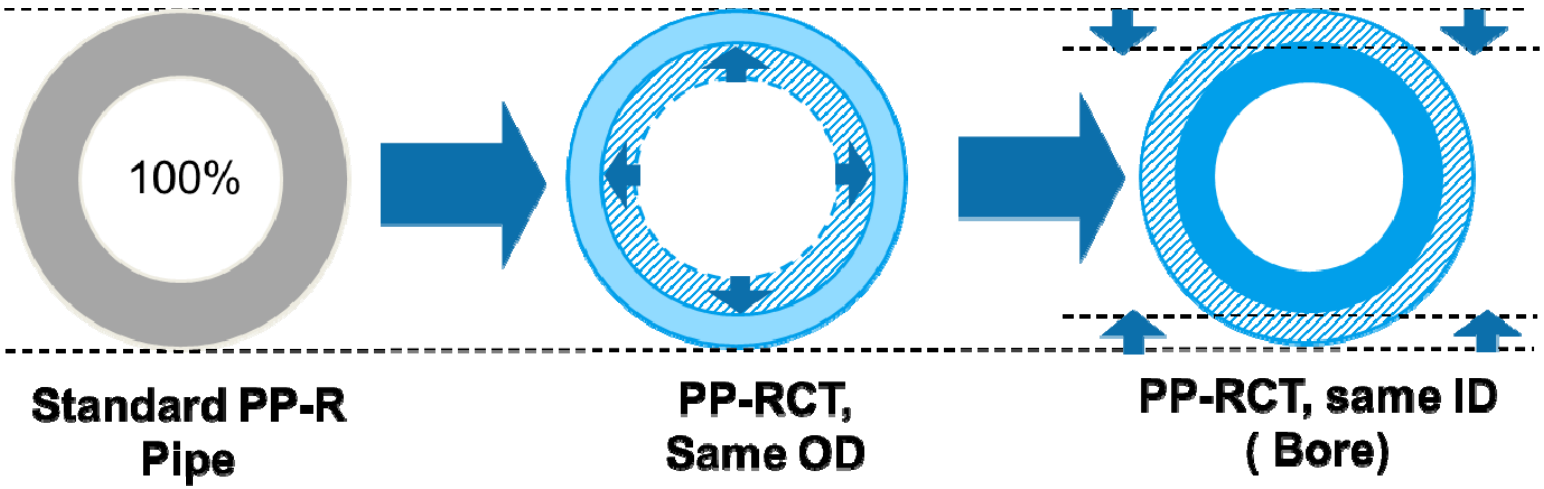
¨Practical example : Pipe DN20, 10 bars, class 2 according to ISO15874

	PP-R	PP-RCT, same Ø	PP-RCT, same bore
Ø	**20 mm** →	**20 mm**	16 mm
e	4,1	2,8	2,2
ID	**11,8** →	14,4	**11,6**
Weight (Kg/m)	0,184	0,136	0,086
Bore difference		+49%	-3%
weight saving		**26%**	**53%**



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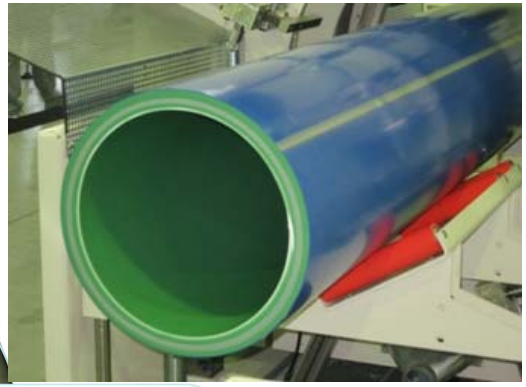
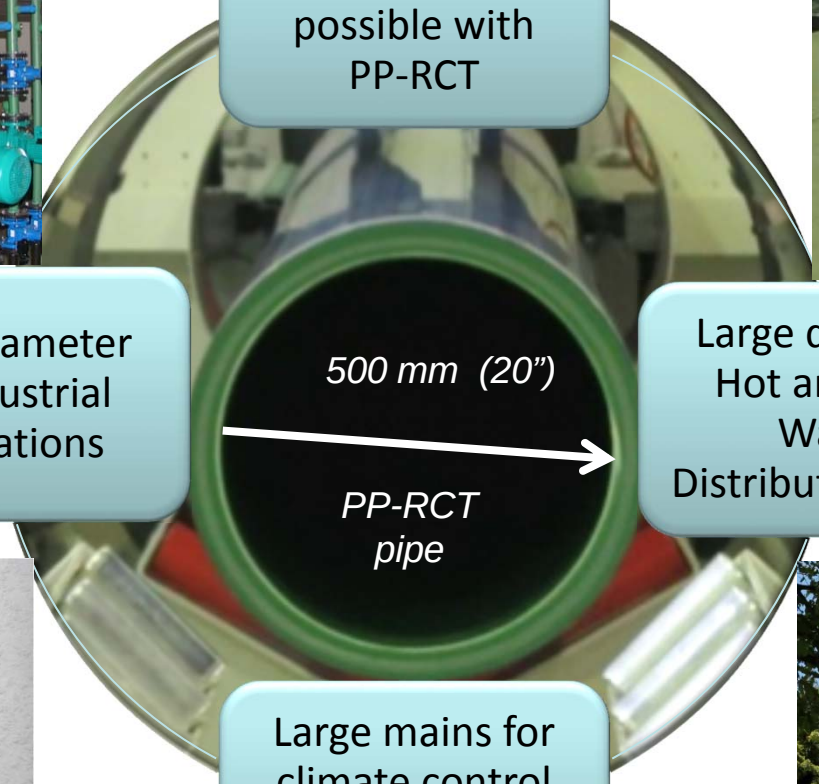
Largest PP-RCT pipe ever produced; just imagine the possibilities with new applications!



Large diameter pipes made possible with PP-RCT



Large diameter for Industrial applications



Large diameter Hot and Cold Water Distribution Pipes



Large mains for climate control systems in Sky rises



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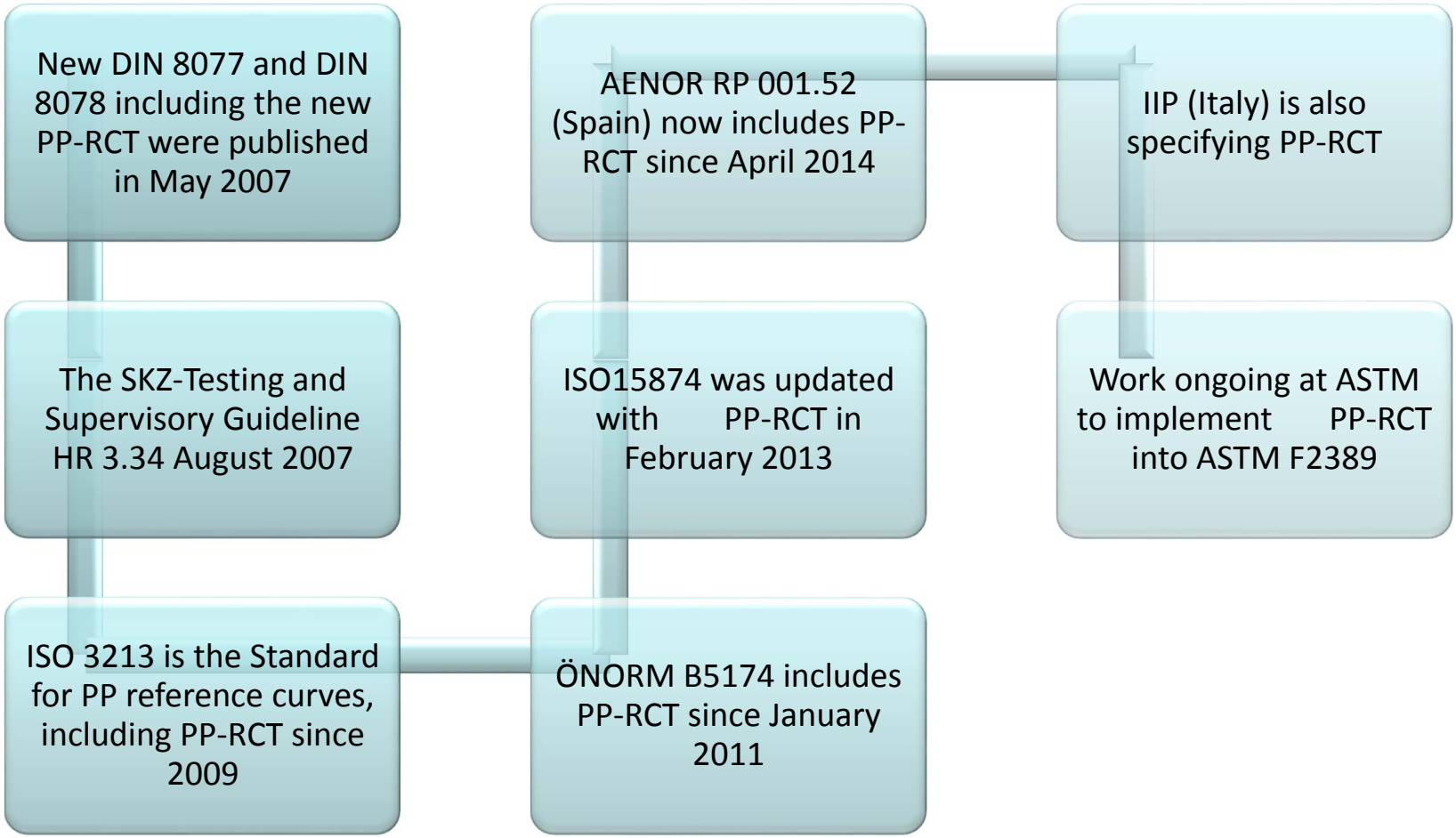
PP-RCT is fully established in local- as well as global standards



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Bringing PP-RCT to practice: King Abdullah Financial District Case Study



- The King Abdullah Financial District (KAFD) is a development launched in 2007 in Riyadh, Saudi Arabia
- 34 towers in an area of 1.6 million square metres (395 acres)
- World class skyscrapers of 20 to 80 floors, with the very highest demands on their piping networks

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The challenge: Top performance requested

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Performance and handling

- A pipe system with high enough pressure performance (up to 3 x times the normal pressure requested)
- Ease of handling and installation

Multiple end-use

- Hot & cold water distribution network:
- Drinking water distribution
- Cooling systems

Other requests

- Good performance in hot climates
- Low noise system
- No corrosion
- Cost efficient/low maintenance over time



Courtesy of Bänninger





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The solution: PP-RCT selected due to its high performance and track record to deliver

- PP-RCT pipes 20- 250 mm (~0.8-10”) selected to serve all requirements for the hot & cold water distribution
- Serving a pressure of up to 15 bars (2175 PSI), ca 3 times higher than normal requirements
- At temperatures up to 40ºC (104ºF)
- Increased pressure resistance made possible with PP-RCT, reduced the number of pump stations needed by 50%
- Pipes could be supplied in SDR 7,4 instead of SDR 6 (as for standard PP-R)
- Easy handling and installation vs. steel (ca 1/3 the weight)
- Improved operability (i.e. no condensation)

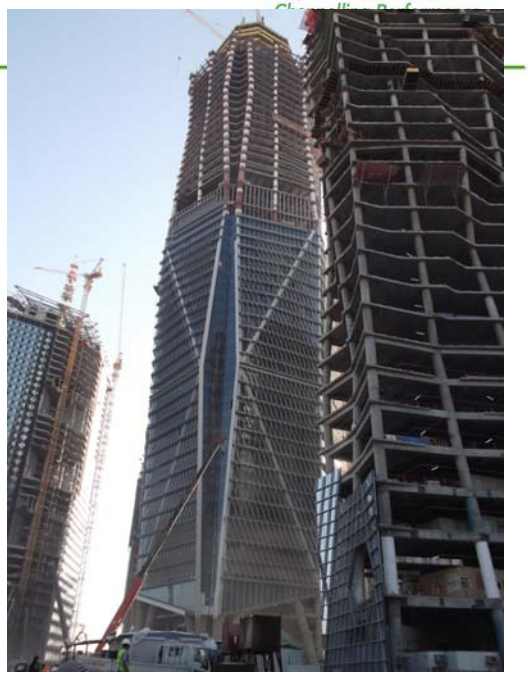




Pictures courtesy of Bänninger

Outlook and concluding remarks

- PP-R revolutionised the position of hot & cold water plastics piping
- With over 10 years track record, PP-RCT offers a step-change in PP-R piping
- PP-RCT enables higher internal pressures at high temperatures or an increased hydraulic capacity
- PP-RCT opens up for new applications incl. large diameters for Industrial and mains for e.g. skyrises
- PP-RCT is now well represented in regional- as well as global standards
- Performance with disinfectants will be the next big topic for PP-RCT and testing is ongoing
- PP-RCT is continuously selected for the most demanding construction projects globally





Pictures courtesy of Bänninger

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Thank you

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