



MAKE SAVINGS WITH HIGH-STRENGTH STEEL

# DILLIMAX

DILLINGER HÜTTE GTS



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## WEIGHT REDUCTION BELONGS IN EXPERIENCED HANDS

High-strength and super high strength steels have completely conquered the construction machinery sector in the past years. No wonder since construction machines have to move great loads in addition to their own weight. The calculation is simple: the intrinsic weight of the structure counts against the useful load. To gain on the one side, you must take off on the other – without detracting from the safety of the structure. This is possible on a large scale using high-strength and super high strength steels.

Furthermore, a reduction in the amount of steel naturally low-

ers the costs for material and manufacture. A leading crane manufacturer has determined that the costs for the supporting structure of mobile cranes can be reduced of 60 % by using the high-strength S690Q grade instead of the conventional S355 grade. The welding costs can be reduced of further 40 % by using S960Q (Cost calculation and cost reduction in welding technology, Aichele and Spreitz, DVS Verlag, 2001, p. 104).

Major construction machinery manufacturers earn their good reputation above all else with the service they offer their clients. To ensure this requires

appropriate delivery conditions from their part suppliers. Steel producers must therefore supply their materials in the highest quality. At the same time, they must ensure constant material availability at short notice, as well as comprehensive advisory services on all matters of application and processing.

Not only renowned construction machinery manufacturers have chosen to use the DILLIMAX high-strength structural steels. Outstanding steel constructions also rely on DILLIMAX: for example bridges, flood gates, penstocks and jack-up rigs.





## HELP YOUR MACHINES LOSE WEIGHT

If the load bearing parts of your machines – for example crane jibs, chassis or free-standing frames – are still made of conventional steel grades, then it is time for you to pay a visit to the design department. This kind of structural components is generally made of hollow sections. The use of high-strength DILLIMAX enables a drastic wall thickness reduction, if the geometry of the cross-section is modified accordingly to maintain the stiffness of the structure. At the end of the day, considerable weight savings can be achieved using both of these measures.

The strength of DILLIMAX is not only achieved by alloying, but mainly by means of a special manufacturing process: controlled quenching in water followed by adequate tempering treatment.

This explains why DILLIMAX is even tougher than conventional structural steels. This characteristic is fundamental for construction machinery subjected to impact load and blows. This steel therefore offers more safety than its predecessors.

DILLIMAX retains its high brittle fracture insensibility even at low temperatures, especially the extra tough grades. You should therefore choose DILLIMAX T or E for machines to be used in low-temperature regions.

Please consider the example of DILLIMAX 690

Tensile strength $R_m$	770 - 940 MPa <sup>1)</sup>	
Minimum yield strength $R_{eH}$	690 MPa <sup>2)</sup>	
Minimum elongation $A_5$	14 %	
Notch impact energy $A_v$ (min. values)		
Basic grade B	30 J (27 J) <sup>3)</sup>	at -20 °C
High toughness grade T	30 J (27 J) <sup>3)</sup>	at -40 °C
Extra tough grade E	30 J (27 J) <sup>3)</sup>	at -60 °C

<sup>1)</sup> At room temperature, plate thickness up to 100 mm.

<sup>2)</sup> At room temperature, plate thickness up to 65 mm.

<sup>3)</sup> Average of 3 Charpy-V samples, parallel (transverse) to rolling direction.

Complete data is contained in the corresponding material data sheet.



## DILLIMAX CAN DO EVEN MORE

### **Reduce the size of your steel stock**

DILLIMAX has other interesting properties which can help you optimize your material stock handling. For instance, the unusually high strength of the steel also results in a higher degree of wear resistance.

In addition, DILLIMAX demonstrates relatively good strength properties at high temperature (up to 400 °C). This grade can therefore be used also for fans and drying furnaces in the cement industry.

*The AC 95 mobile crane  
from Terex-Demag.*



### **Not afraid of hard work**

The advantages of DILLIMAX in application are not offset by disadvantages in manufacturing. Of course, a little more care is needed when welding DILLIMAX steels, in proportion to the increase of yield strength. However, thanks to its low carbon content, DILLIMAX can be welded using all standard methods, under suitable conditions up to 20 mm plate thickness without preheating.

Furthermore, DILLIMAX can be easily cold formed by bending or edging, whereby increased forming forces and elastic spring-back should be considered. Machining DILLIMAX steels neither causes difficulties if suitable tools are used.



## THE DILLIMAX RANGE

In addition to DILLIMAX 690, we would also like to recommend to you three other steel grades: DILLIMAX 890, 965

and 1100. These grades have been developed to comply with extreme strength requirements. The properties of all four steels

are summarized below. Two other DILLIMAX grades complement this range: DILLIMAX 500 and 550.

The DILLIMAX range in summary				
DILLIMAX	690 T	890 T	965 T	1100
Available plate thickness in mm	10 - 200	10 - 100	10 - 100	10 - 30
Delivery condition	quenched and tempered	quenched and tempered	quenched and tempered	quenched and tempered
Tensile strength in MPa	770 - 940 <sup>1)</sup>	940 - 1100 <sup>3)</sup>	980 - 1150 <sup>3)</sup>	1200 - 1500
Minimum yield strength in MPa	690 <sup>2)</sup>	890 <sup>3)</sup>	960 <sup>3)</sup>	1100
Minimum elongation A <sub>5</sub> in %	14	12	12	10
Notch impact energy in J at -20 °C <sup>4)</sup>	≥ 40 (30)	≥ 40 (30)	≥ 40 (30)	≥ 40 (30)
Notch impact energy in J at -40 °C <sup>4)</sup>	≥ 30 (27)	≥ 30 (27)	≥ 30 (27)	≥ 30 (27)
Cold forming, min. bending radius <sup>5)</sup>	2t (3t)	3t (4t)	3t (4t)	5t (6t)
Cold forming, min. die opening <sup>5)</sup>	7t (9t)	9t (12t)	9t (12t)	14t (16t)

All DILLIMAX grades fulfil the requirements of EN 10025-6 and even exceed them in many cases.

<sup>1)</sup> Plate thickness up to 100 mm  
<sup>2)</sup> Plate thickness up to 65 mm  
<sup>3)</sup> Plate thickness up to 50 mm  
<sup>4)</sup> Average of 3 Charpy-V samples, parallel (transverse) to rolling direction  
<sup>5)</sup> Bending line transverse (parallel) to the rolling direction; t = plate thickness



## AND TO MAKE THINGS EVEN EASIER FOR YOU

### **Here's an insider tip...**

Our brochure "DILLIMAX – Technical information" provides you with comprehensive data on the processing of DILLIMAX. Further detail can be found in our technical data sheets, which you may order anytime from your steel stockist or on Internet at [www.dillinger.de](http://www.dillinger.de). Should you have any questions regarding the handling of DILLIMAX, you can contact our service fax and email day and night. Please pass these indications on to your engineers:

(+49) 68 31 47 99 21 46

marketing-earth-moving  
@dillinger.biz

We'll get back to you promptly.

In this way, the technical experts are in direct contact with each other, enabling you to concentrate fully on your own tasks and responsibilities.

### **Leave availability concerns up to us**

Anyone responsible for the purchasing of high-strength steel grades wants to be sure that replacement material can be obtained in good time. Please let your engineers know that you can always supply them with DILLIMAX in sufficient quantities. This is provided by

the extensive sales system and the delivery contracts which Dillinger Hütte GTS has concluded with a multitude of steel stockists – including one not far from your facilities, who can supply you with DILLIMAX even at very short notice.

If required, the steel can be supplied cut to size, shot blasted, coated and ready to weld.



*Schwing concrete pump.*



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## WE MAKE THE STEEL

If you wish to order  
DILLIMAX 690 or other grades  
from the DILLIMAX range, or  
simply want more information

about these materials, then  
please get in touch with one of  
the sales organizations of  
Dillinger Hütte GTS.

Smaller steel quantities can also  
be obtained directly from your  
steel stockist.

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