Introduction

All over the world, prepainted metal is used for many different applications and its processing can be very demanding. However, just like with all the other materials it is necessary to follow certain rules when storing and handling it in order to achieve maximum lifespan and the best appearance possible.

When handling prepainted metal, two basic factors are crucial. Those guidelines aim to minimize both of these factors, which are:

- Physical damage,
- Degradation, including the base metal corrosion, caused by external factors or ageing.

Painted metal is usually produced and supplied in the form of bands, that is why these instructions deal with the bands first. For other production procedures the painted metal is further cut and kept in a form of sheets, these instructions therefore deal with this form as well. A great deal of painted metal is used for construction purposes and the handling and storing metal in construction areas is difficult in its very essence. Nonetheless, the same principles apply in this situation as well. With respect to both long-term resistance and immediate damage it is necessary to follow these steps to prevent corrosion and damage of the stored painted material.

In all cases those instructions aim to ensure that the prepainted metal gets to the place of its final use in optimal condition. Preventing damage not only ensures long lifespan and ideal appearance but it can also prevent loss and increased cost resulting from repeated production. In some cases it does not always have to be required to accept all the provided instructions in their entirety, therefore the instructions are divided into:

• **Basic rules** – there is no reason for not following those rules

• **Best practice** – for the sake of maintaining the quality of the metal it is necessary for those rules to be to observed.

Storage and handling of bands

Basic rules

Keep the material dry

Even when the best surface finish techniques are used, the base metal used to produce the prepainted metal (for example steel or aluminum) is basically prone to corrosion. When the metal is rolled up in bands, the capillary effect can cause capillary rise of water that can stay between the individual layers of metal for a long time. Although it is not always possible to provide storage indoors, it is necessary to ensure that the bands are in a dry environment and that condensation does not occur. In this respect it is not sufficient to rely on plastic or paper wrappings, because such wrappings have not been designed to prevent water from getting in. Besides, they can cause other problems as well, because the moisture cannot get out. It is important to provide sufficient ventilation in order to prevent the water vapor from collecting and to allow the water to dry up.

Store the bands on a clean smooth surface

Prepainted metal bands can weigh up to several tons and it is therefore necessary to remove any obstacles and bumps. A small incision in the outer band can be indented into several layers of the roll, thus causing damage to many meters of material. The material is best stored in a space that has been designed specially for this purpose, but no matter where it is stored, it is necessary that the rolls are placed on a smooth and clean surface.

Prevent damage when handling

The bands have to be handled with care and they cannot be dragged along the surface. They must be stored with sufficient spacing among them so that they can be moved without risk of being damaged.

Use the bands quickly

Just like the properties of other materials, the properties of painted metal slowly change over time. Especially some product can get harder over time and lose their flexibility for shaping. Also when the protective strip foil has been applied, it is necessary to use the material quickly to prevent the likelihood of glue residua adhesion from increasing. Considering the correct operating practice, it is recommended to use all material up within six months from the production date, which can be helped by using the first-in first-out (FIFO) stock rotation system.

Best practice

Store the bands indoors

The easiest way to ensure that the material is kept dry is to store it indoors.

Store the bands in a controlled temperature environment

Even when the material is stored indoors, great fluctuations in air temperature can occur that can led to moisture condensation on the metal bands that contributes to corrosion. It is therefore recommended to ensure that the temperature remains as constant as possible and not under the dew point.

Prevent condensation

If it is not possible to store the bands at a constant temperature, sudden changes in temperature that can lead to condensation of air water on the surface of the metal material should be prevented. Since this could happen for example when the material is placed directly into a heated storeroom, it is crucial to provide sufficient ventilation of the room so that the possible condensation can evaporate as quickly as possible. The temperature can drop below the dew point under the following circumstances:

1. **During storage**

   When storing metal, it is not recommended to keep the storeroom open especially during the spring and the autumn months when there can be extreme fluctuations between day and night temperatures. When the temperature and air humidity increase fast during the day, the dew point increases rapidly. However, the temperature of the metal increases much more slowly, which creates ideal conditions for condensation on the surface of the metal. This phenomenon can of course appear in different seasons as well - it can occur any time when significant changes in temperature and humidity appear.

2. During loading

On a humid day, loading metal from a cold storage room into a heated truck or railway car can cause water to condensate on the metal. Although this problem can occur in any season, in certain areas it can be more significant during summer.

3. When storing cold metal in a heated storeroom

Condensation during unloading is more likely to occur during colder months. The following example can clarify the situation:

Metal with a temperature of 16 ˚C has been loaded from a storeroom to a truck and transported for two days. The outside temperature is around -1 ˚C. During the transport, the temperature of the metal has gradually dropped to the outside temperature of -1 ˚C.

When the metal arrives at the pace of destination, it is unloaded and placed directly into the storeroom with the temperature of 16 ˚C and the relative humidity of 50 %. **According to the table, the dew point is 5 ˚C.** Since the temperature of the band or the sheet is lower than the air dew point at the moment, optimal conditions for water condensation on the surface of the metal, for example at the edge of the stacked sheets or rolls, occur. The condensed water can get between the individual layers, thus creating water stains.

Air temperature in degrees Centigrade

Tepl. vzd.	% Relativní vlhkost																		
°C	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
43	43	42	41	40	39	38	37	35	34	32	31	29	27	24	22	18	16	11	5
41	41	39	38	37	36	35	34	33	32	29	28	27	24	22	19	17	13	8	3
38	38	37	36	35	34	33	32	30	29	27	26	24	22	19	17	14	11	7	0
35	35	34	33	32	31	30	29	27	26	24	23	21	19	17	15	12	9	4	0
32	32	31	31	29	28	27	26	24	23	22	20	18	17	15	12	9	6	2	0
29	29	28	27	27	26	24	23	22	21	19	18	16	14	12	10	7	3	0	
27	27	26	25	24	23	22	21	19	18	17	15	13	12	10	7	4	2	0	
24	24	23	22	21	20	19	18	17	16	14	13	11	9	7	5	2	0		
21	21	20	19	18	17	16	15	14	13	12	10	8	7	4	3	0			
18	18	17	17	16	15	14	13	12	10	9	7	6	4	2	0				
16	16	14	14	13	12	11	10	9	7	6	5	3	2	0					
13	13	12	11	10	9	8	7	6	4	3	2	1	0						
10	10	9	8	7	7	6	4	3	2	1	0								
7	7	6	6	4	4	3	2	1	0										
4	4	4	3	2	1	0													
2	2	1	0																
0	0																		

Use storage areas designated for this purpose

The best solution is to use stands designed with respect to the actual end application of the metal with contact points made of wood, metal or with felt finish. The condition of the

stands should be inspected regularly. The contact surfaces should be in the form of a letter "V" in order to support the roll adequately and to prevent it from being flattened. If the bands have to be stored directly on the ground, it is necessary to use felt or rubber pads that will ensure correct weight distribution. When the bands are supplied on wooden pallets, is it often the best solution to keep them on the pallets until they are used. Nonetheless, small partially used rolls do not have to be placed on pallets, it is therefore necessary to exercise proper care when handling them.

Do not stack the bands atop each other

Stacking two or more bands atop each other can be a tempting option. However, this method increases the likelihood of damage, since the handling gets more difficult this way. This method also increases the load on the bottom sides of the bands, thus increasing the risk of incisions or pressure damage. Stacking also dramatically increases the risk of accidents. For both reasons - safety and damage prevention - it is necessary to avoid stacking.

Use suitable handling technique

Cranes or fork-lift trucks are usually used to handle the bands. With respect to the best practice, it is recommended to cover the contact surface with a soft material in both cases, such as felt, rubber or cardboard in order to prevent the inner layers from being damaged. Chain loops cannot be used by any means.

Adjust the temperature before use

Some painted metal is designed to be processed at a certain temperature, for example to ensure suitable flexibility. In such cases in is necessary to store the bands at this temperature for at least 24 hours before use.

Storage and handling of sheets

Basic rules

Keep the sheets dry

Just like with bands, it is necessary to keep the bundles of sheet metal dry, because due to capillary rise water can get between the individual layers that can be difficult to remove and cause fast corrosion. Although it is not always possible to provide storage indoors, it is necessary to ensure that the material is in a dry environment and that condensation between the individual sheets does not occur. In this respect it is not sufficient to rely on plastic or paper wrappings, because such wrappings have not been designed to prevent water from getting in. Besides, they can cause other problems as well, because the moisture cannot get out. It is important to provide sufficient ventilation in order to prevent the water vapor from collecting and to allow the water to dry up. It is also necessary to refer to the dew point table that has been mentioned above.

Prevent damage when handling

The sheets have to be handled with care. When storing, they must be kept with sufficient spacing among them so that they can be moved without risk of being damaged. When taking a sheet out of a bundle, the sheets must not be dragged along the surface, because they might scratch the bottom layer.

Use the sheets quickly

Just like the properties of other materials, the properties of painted metal slowly change over time. Especially some products can get harder over time and lose their flexibility for shaping. Also when the protective strip foil has been applied, it is necessary to use the material quickly to prevent the likelihood of glue residua adhesion from increasing. Considering the correct operating practice, it is recommended to use all material up within six months from the production date, which can be helped by using the first-in first-out (FIFO) stock movement system.

Best practice

Keep the material dry

Even when the best surface finish techniques are used, the base metal used to produce the prepainted metal (for example steel or aluminum) is basically prone to corrosion. Although it is not always possible to provide storage indoors, it is necessary to ensure that the sheets are in a dry environment and that condensation does not occur. In this respect it is not sufficient to rely on plastic or paper wrappings, because such wrappings have not been designed to prevent water from getting in. Besides, they can cause other problems as well, because the moisture cannot get out. It is important to provide sufficient ventilation in order to prevent the water vapor from collecting and to allow the water to dry up.

Store the sheets

so that the table describing the dew point is adhered to. It is also necessary to pay attention to the cleanliness of the underlying frames, even the tiniest stone will cause pressure damage that can subsequently show in several sheets of metal. The weight of the pallets with sheets stored atop each other must be observed. The underlying frame could indent into the bottom pallet with sheets.

Prevent damage when handling

The sheets have to be handled with care and they cannot be dragged along the surface. When storing, they must be kept with sufficient spacing among them so that they can be moved without risk of being damaged.

Use the sheets quickly

Just like the properties of other materials, the properties of painted metal slowly change over time. Especially some product can get harder over time and lose their flexibility for shaping. Also when the protective strip foil has been applied, it is necessary to use the material quickly to prevent the likelihood of glue residua adhesion from increasing. Considering the correct operating practice, it is recommended to use all material up within six months from the production date, which can be helped by using the first-in first-out (FIFO) stock rotation system.

Construction panels

Basic rules

Keep the panels dry

Paradoxically, although people rely on the fact that the panels will be resistant to weather for the lifetime of the building, it is the construction site where their proneness to corrosion is the highest. Just like with bands or bundles of metal sheets, water can get between the stored panels through capillary flow and remain there even after the surface dries up, thus encouraging corrosion for a long time. Since there is usually no natural protection against rain at a construction site, it is especially important to take steps that will ensure that the panels will stay dry.

Prevent damage

Construction panels must always be handled with care. They are produced in order to be placed just next to each other and to provide a building with weather protection - all dents or scratches, especially round the edges, can therefore affect their weather resistance. And besides, scratches that may seem unimportant at the first sight can act as weak points of the surface layer that can cause corrosion later and disrupt the resistance of a building against weather without this problem being apparent. Panels should be stored in areas designated for this purpose away from the main routes for staff and machinery and with sufficient space for maneuvering of fork-lift trucks or other handling equipment. Panels should be lifted with maximal care to avoid scratching or damaging the edges, they should be supported along their entire length to avoid bending.

Use the panels quickly

The longer the panels at a construction site, the higher the probability that they will get damaged. Besides, longer storage in a damp environment encourages corrosion, so one of the methods of protection is to ensure that the presence of panels at the site is kept to minimum. That requires elaborated planning, ordering, stock rotation and general project management. If there is a protective strip foil on a panel, it has to be removed as soon as possible after the panel has been mounted, since the effect of adhesive substances increases over time, and especially due to sunlight exposure the residua could cling to the panel, which would later cause dirt to stick on it. This protective foil should be removed 6 months at the latest after it was applied or 1 month at the latest after the panel has been mounted to a building.

Best practice

Store them indoors

The most reliable method for keeping the stored panels dry is to store them indoors, away from open doors and ventilation apertures.

Store them covered

On most building sites it would not be practical to store panels indoors. If it is not possible, it is important to ensure at least a sufficient covered area where they could be stored. This can be achieved by building a framework out of scaffold pipes what will be covered with a tarpaulin or a similar material over the entire area where the panels are stored. It is necessary to ensure sufficient air flow and a sufficient space between the

panels and the waterproof layer. In any case the tarpaulin must surround the entire bundle and there must be sufficient spaces everywhere to allow the air flow.

Do not store them on the ground

Most panel packages are supplied on wooden pallets, squared logs or polystyrene bases that must be retained when storing the panels. Those bases ensure that the panels will not come into contact with the ground and that they will be sufficiently ventilated. Those aids also provides adequate support along the entire length of the panels. This is equally important for the individual panels after they have been removed from the bundle. Ideally the panels should be lifted to a height of at least 30 cm to provide sufficient ventilation and to minimize the risk of being sprayed or damaged.

Store them tilted

In addition to the fact that panels must be stored on a flat surface, it is also recommended for this surface to be slightly tilted (3 - 5°) in order to let the water flow away.

Lift them with care

When pallets with packings of panels are lifted using a crane, use nylon slings, not chain ones - nonetheless, there is always risk that the edges will get damaged, so it is necessary to proceed with care. A better alternative is to use a specially designed bar that will ensure that the weight will be distributed to the right spots. Special suction cups are often used for sandwich panels - they offer sufficient support and minimize the risk of damage. When a fork-lift truck is used, the forks have to be adjusted so that they support the panel along its entire length or a special tool for weight distribution has to be used. When panels are handled by hand, they must be lifted by the edges and carried vertically with the longer edge in the horizontal position. Panels longer than 3 m should be carried by two people so that they would not bend.

Composed based on the following materials:
ECCA Technical paper 2 - May 2010 – Storage Guidelines for Prepainted Metals
Storage regulations of METAL TRADE COMAX, a.s.